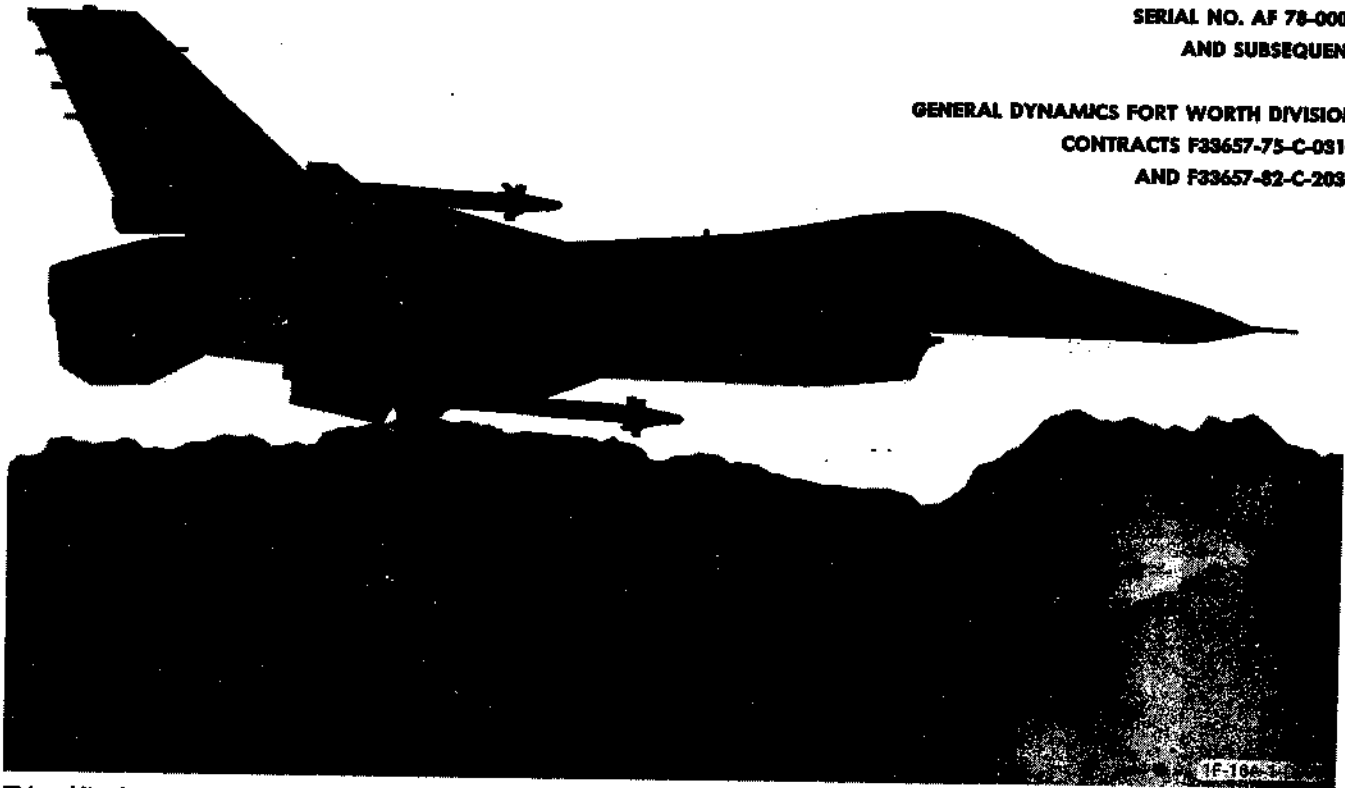
FLIGHT MANUAL

USAF/EPAF SERIES AIRCRAFT

F-16A/B

SERIAL NO. AF 78-0001
AND SUBSEQUENT

GENERAL DYNAMICS FORT WORTH DIVISION
CONTRACTS F33657-75-C-0310
AND F33657-82-C-2034



1F-16A-1

This publication is required for official use or for administrative or operational purposes only. Distribution is limited to US Government agencies. Other requests for this document must be referred to Aeronautical Systems Division (ASD), Deputy for F-16, Directorate of Logistics, ATTN: YPL, Wright-Patterson AFB, OH 45433.

This manual is incomplete without T.O. 1F-16A-1-1.

For RNLAF this manual is incomplete without T.O. NE1F-16A-1.

This change incorporates Safety Supplements T.O. 1F-16A-1SS-267, -269, and -273 and Operational Supplement T.O. 1F-16A-1S-271.

See Technical Order Index T.O. 0-1-1-4 and its supplements for current status of Flight Manuals, Safety Supplements, Operational Supplements, and Flight Crew Checklists.

Commanders are responsible for bringing this publication to the attention of all Air Force personnel cleared for operation of subject aircraft.

Published under authority of the Secretary of the Air Force.

21 MAY 1984

CHANGE 1 10 DECEMBER 1984

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

LIST OF EFFECTIVE PAGES

NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands, shading, or legend.

Dates of issue for original and changed pages are:

Original .... 0 ....21 May 84
Change .... 1 .... 10 Dec 84

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 568, CONSISTING OF THE FOLLOWING:

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Title	1	3-1	1	5-33	1
A	1	3-2 – 3-12	0	5-34 – 5-40	0
B Added	1	3-13	1	5-40.1 Added	1
C Blank Added	1	3-14	0	5-40.2 Blank Added	1
a	1	3-15	1	5-41	1
b Blank	0	3-16 – 3-28	0	5-42 – 5-44	0
i – iv	0	3-29	1	5-44.1 – 5-44.3 Added	1
v – ix	1	3-30 – 3-37	0	5-44.4 Blank Added	1
x	0	3-38	1	5-45 – 5-46	1
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1-74 – 1-97	0	3-88 – 3-96	0	5-60	0
1-98	1	4-1	0	5-61 – 5-68 Added	1
1-99 – 1-118	0	4-2 Blank	0	5-68.1 – 5-68.5 Added	1
2-1 – 2-13	0	5-1 – 5-4	1	5-68.6 Blank Added	1
2-14	1	5-5 – 5-11	0	5-69 – 5-76	0
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2-21	1	5-20	0	6-8 – 6-9	0
2-22 – 2-37	0	5-21 – 5-25	1	6-10 Blank	0
2-38 Blank	0	5-26 – 5-32	0	7-1	1

CURRENT FLIGHT CREW CHECKLIST
T.O. 1F-16A-1CL-1
21 MAY 1984
CHANGE 1   10 DECEMBER 1984

* Zero in this column indicates an original page.

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

LIST OF EFFECTIVE PAGES (Cont)

Page No.	* Change No.
7-2 – 7-4	0
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A1-1	1
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A2-1 – A2-21	0
A2-22	1
A2-23 – A2-29	0
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A3-1 – A3-4	0
A3-5	1
A3-6 – A3-10	0
A4-1 – A4-52	0
A5-1/A6-1 – A6-6	0
A7-1 – A7-8	0
Glossary 1 – Glossary 4	0
Index 1 – Index 9	1
Index 10 Blank	0
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Foldout 24	1
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* Zero in this column indicates an original page.

FLIGHT MANUAL, SAFETY SUPPLEMENT, AND OPERATIONAL SUPPLEMENT STATUS

This supplement status page is based on information available as of 10 December 1984. It is not an official status page.

Flight Manual	Basic Date	Change No. and Date
T.O. 1F-16A-1	21 May 1984	1 10 Dec 1984
Supplemental Flight Manual	Basic Date	Change No. and Date
T.O. 1F-16A-1-1	9 Oct 1981	1 18 Oct 1982
Flight Crew Checklist	Basic Date	Change No. and Date
T.O. 1F-16A-1CL-1	21 May 1984	1 10 Dec 1984

OUTSTANDING SAFETY AND OPERATIONAL SUPPLEMENTS

Number	Date	Short Title	Flight Manual Sections Affected
None			

INCORPORATED SAFETY AND OPERATIONAL SUPPLEMENTS

Number	Date	Short Title	Flight Manual Sections Affected
T.O. 1F-16A-1SS-267	6 Jun 84	Engine Fire	III
T.O. 1F-16A-1SS-269	2 Jul 84	Icy/Wet Runway Landings	I, II, VII
T.O. 1F-16A-1S-271	17 Oct 84	Maximum Command Roll and Asymmetric G Restrictions	V
T.O. 1F-16A-1SS-273	19 Oct 84	Low Thrust on Takeoff	III

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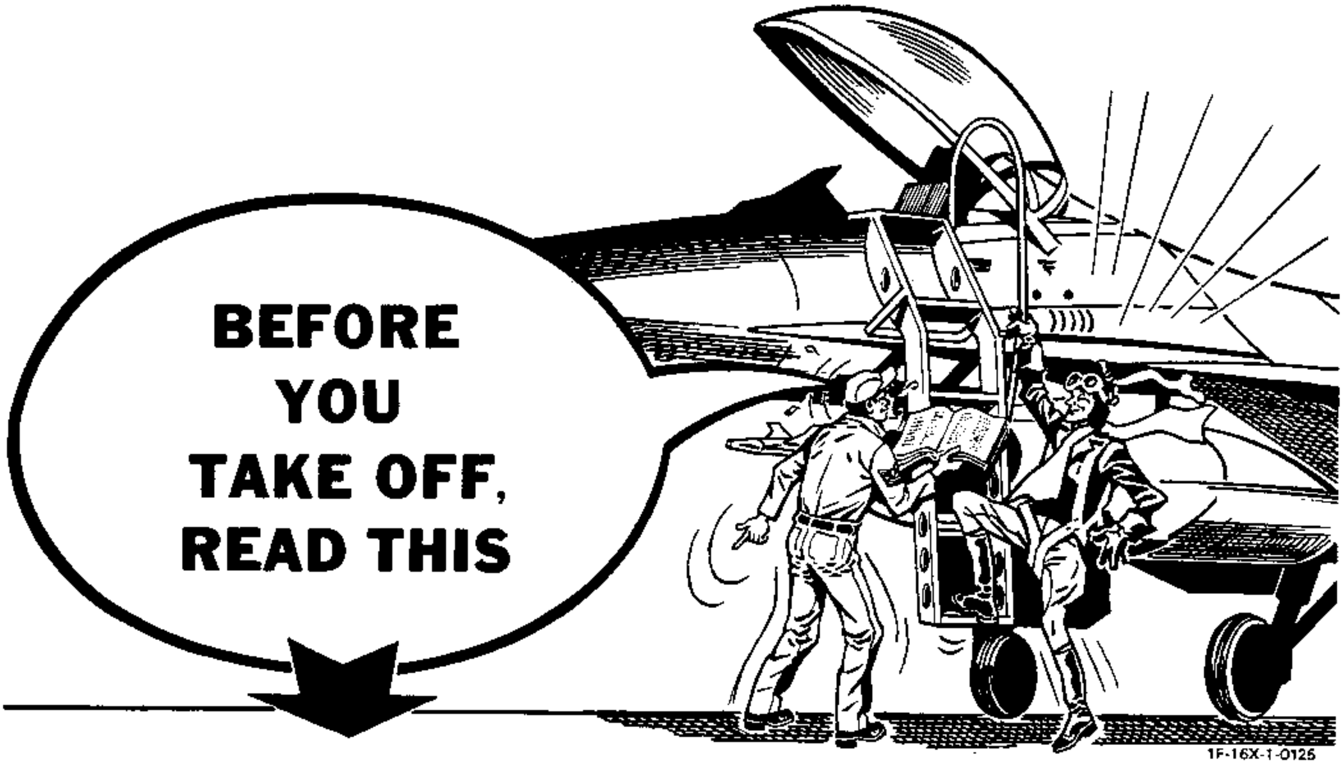

SCOPE

This manual contains the necessary information for safe and efficient operation of the aircraft. These instructions provide a general knowledge of the aircraft and its characteristics and specific normal and emergency operating procedures. Pilot experience is recognized; therefore, basic flight principles are avoided. Instructions in this manual are prepared to be understandable by the least experienced pilot who can be expected to operate the aircraft. This manual provides the best possible operating instructions under most conditions. Multiple emergencies, adverse weather, terrain, etc., may require modification of the procedures. This manual must be used with one or more of the following manuals to obtain information necessary for safe and efficient operation:

T.O. 1F-16A-1-1	Supplemental Flight Manual, F-16A/B Aircraft (CONFIDENTIAL) (Title Unclassified)
T.O. 1F-16A-6CF-1	Acceptance and Functional Check Flight Procedures Manual, F-16A/B Aircraft
T.O. 1F-16A-25-1	Nuclear Weapons Delivery Manual (SECRET) (Title Unclassified)
T.O. 1F-16A-25-10	Aircrew Practice Bomb Delivery Procedures
T.O. 1F-16A-34-1-1	Nonnuclear Munitions Delivery
T.O. 1F-16A-34-1-2	Nonnuclear Munitions Ballistics
T.O. 1-1C-1	Basic Flight Crew Air Refueling Procedures
T.O. 1-1C-1-30	F-16 Flight Crew Air Refueling Procedures

PERMISSIBLE OPERATIONS

The flight manual takes a positive approach and normally states only what can be done. Unusual operations or configurations are prohibited unless specifically covered herein. Clearance must be obtained before any questionable operation which is not specifically permitted in this manual is attempted.

HOW TO BE ASSURED OF HAVING LATEST DATA

Refer to T.O. 0-1-1-4 for a listing of all current flight manuals, safety supplements, operational supplements, and checklists. Also, check the flight manual cover page, the title block of each safety and operational supplement, and all status pages contained in the flight manual or attached to formal safety and operational supplements. Clear all discrepancies before flight.

ARRANGEMENT

The manual is divided into seven fairly independent sections and an appendix to simplify reading it straight through or using it as a reference manual.

ILLUSTRATIONS

Cockpit arrangement, cockpit console, and cockpit instrument panel illustrations display the delivered configuration plus the equipment modifications which have been approved. For details of equipment modification, see the individual equipment illustration.

SUPPLEMENT INFORMATION AND GUIDELINES

Supplements are safety or operational and are indicated -1SS or -1S, respectively. Supplements are issued as interim (teletype messages) or formal (printed copies). All interim supplements will be assigned odd numbers, such as -1SS-195. When an interim supplement is formalized, it will be assigned the next following even number, such as -1SS-196. Formal supplements not preceded by an interim supplement will also be assigned even numbers. Interim supplements may not be formalized when they are issued immediately prior to a change or revision in which they are incorporated. Occasionally, a supplement will have dual references in the instructions; this is because the supplement applies to the present and subsequent manual. Minor text/illustration changes or deletions will be given as instructions in the supplement. When lengthy additions are required, the formal supplement will provide one-side insert page(s) to the flight manual and checklist. This supplement page(s) will be attached to the original page(s). The original page will remain in the manual or checklist in case the supplement is rescinded and the page is needed. Added pages (i.e., 3-48.1) will be inserted in their proper numerical sequence and may be printed on both sides.

SAFETY SUPPLEMENTS

Information involving safety will be promptly forwarded in a safety supplement. Urgent information is published in interim safety supplements and transmitted by teletype. Formal supplements are mailed. The supplement title block and status page (published with formal supplements only) should be checked to determine the supplement's effect on this manual and other outstanding supplements.

OPERATIONAL SUPPLEMENTS

Information involving changes to operating procedures will be forwarded by operational supplements. The procedure for handling operational supplements is the same as for safety supplements.

CHECKLIST

The checklist contains itemized procedures without all of the amplification. Primary line items in the flight manual and checklist are identical.

HOW TO GET PERSONAL COPIES

Each pilot is entitled to a personal copy of the flight manual, safety supplements, operational supplements, and a checklist. The required quantities should be ordered before needed to assure their prompt receipt. Check with the publication distribution officer whose job is to fulfill T.O. requests. Basically, the required quantities must be ordered from the appropriate Numerical Index and Requirement Table (NIRT). T.O. 00-5-1 and T.O. 00-5-2 give detailed information for properly ordering these publications. Make sure a system is established at the base to deliver the publications to the pilots immediately upon receipt.

FLIGHT MANUAL BINDERS

Looseleaf binders and sectionalized tabs are available for use with the manual. They are obtained through local purchase procedures and are listed in the Federal Supply Schedule (FSC Group 75, Office Supplies, Part I). Check with supply personnel for assistance in procuring these items.

CHANGE SYMBOL

The change symbol, as illustrated by the black line in the margin of this paragraph, indicates text and tabular illustration changes made to the current issue. Changes to illustrations (except tabular and plotted illustrations) are indicated by miniature pointing hands, shading, or legend.

WARNINGS, CAUTIONS, AND NOTES

The following definitions apply to Warnings, Cautions, and Notes found throughout the manual.

WARNING

Operating procedures, techniques, etc., which could result in personal injury or loss of life if not carefully followed.

CAUTION

Operating procedures, techniques, etc., which could result in damage to equipment if not carefully followed.

NOTE

An operating procedure, technique, etc., which is considered essential to emphasize.

USE OF WORDS SHALL, WILL, SHOULD, AND MAY

The words shall or will are to be used to indicate a mandatory requirement. The word should is to be used to indicate a nonmandatory desire or preferred method of accomplishment. The word may is used to indicate an acceptable or suggested means of accomplishment.

PILOT'S RESPONSIBILITY - TO LET US KNOW

Every effort is made to keep the flight manual current. Review conferences with operating personnel and a constant review of accident and flight test reports assure inclusion of the latest data in the manual. Comments, corrections, and questions regarding this manual or any phase of the flight manual program are welcomed. These should be forwarded on AF Form 847 through command headquarters to: ASD/YPDT, Wright-Patterson AFB, Ohio 45433.

PUBLICATION DATE

The date appearing on the title page represents the currency of material contained herein.

AIRCRAFT DESIGNATION CODES

System and/or component effectivity for a particular aircraft version is denoted by a letter code enclosed in a box located in the text or on an illustration. The symbols and designations are as follows:

No code - F-16A and F-16B aircraft

A	F-16A aircraft
B	F-16B aircraft
BF	F-16B aircraft, forward cockpit
BR	F-16B aircraft, rear cockpit
US	USAF
BE	BELGIUM
DE	DENMARK
NE	NETHERLANDS
NO	NORWAY

BLOCK DESIGNATION CODES/SERIAL NUMBER/TAIL NUMBER CROSS-REFERENCE

Because of differences in configuration between aircraft and to avoid repetitious use of aircraft serial numbers, a block effectivity system is used. As each individual aircraft is retrofitted to another block configuration, its serial number/tail number will be moved to the new block. Attrited aircraft will be removed from the listing. The block effectivities reflect the aircraft block, the aircraft serial number, and the tail number. This system is used throughout the manual, both in text and illustrations.

AIRCRAFT MODIFICATION/RETROFIT INFORMATION

Refer to figure FO-16 for applicable T.O./ECP effectivities. It is not an official status page. Refer to T.O. 0-1-1-4 for the complete listing of TCTO's. Short titles listed without a corresponding T.O. number represent engineering change proposals. Throughout this manual, black TV screen symbols containing white numerals (2) are used to distinguish information related to aircraft which have been modified by a specific T.O./ECP. Information pertaining to modified aircraft will be identified by an appropriate effectivity symbol. Information which is not identified by an effectivity symbol is considered common to all aircraft. Information pertaining only to unmodified aircraft will have the appropriate effectivity symbol preceded by **LESS**. For example, **LESS** 4 would indicate that the information is only applicable to aircraft not modified by a specific T.O./ECP.

Block Designation Codes/Serial Number/Tail Number Cross-Reference

BLOCK 10				
Serial and Tail Numbers Same for US A	*78-0058	*79-0325	79-0375	80-0494
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	*78-0060	*79-0327	79-0377	80-0496
	*78-0061	*79-0328	79-0379	80-0497
	*78-0062	*79-0329	79-0380	80-0498
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Block Designation Codes/Serial Number/Tail Number Cross-Reference

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Serial Number/ Tail Number

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DE A

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78-0257/J-257

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Block Designation Codes/Serial Number/Tail Number Cross-Reference

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**78-0263/J-263
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NO A

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78-0297/297
78-0298/298
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BLOCK 15

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Serial Number/ Tail Number

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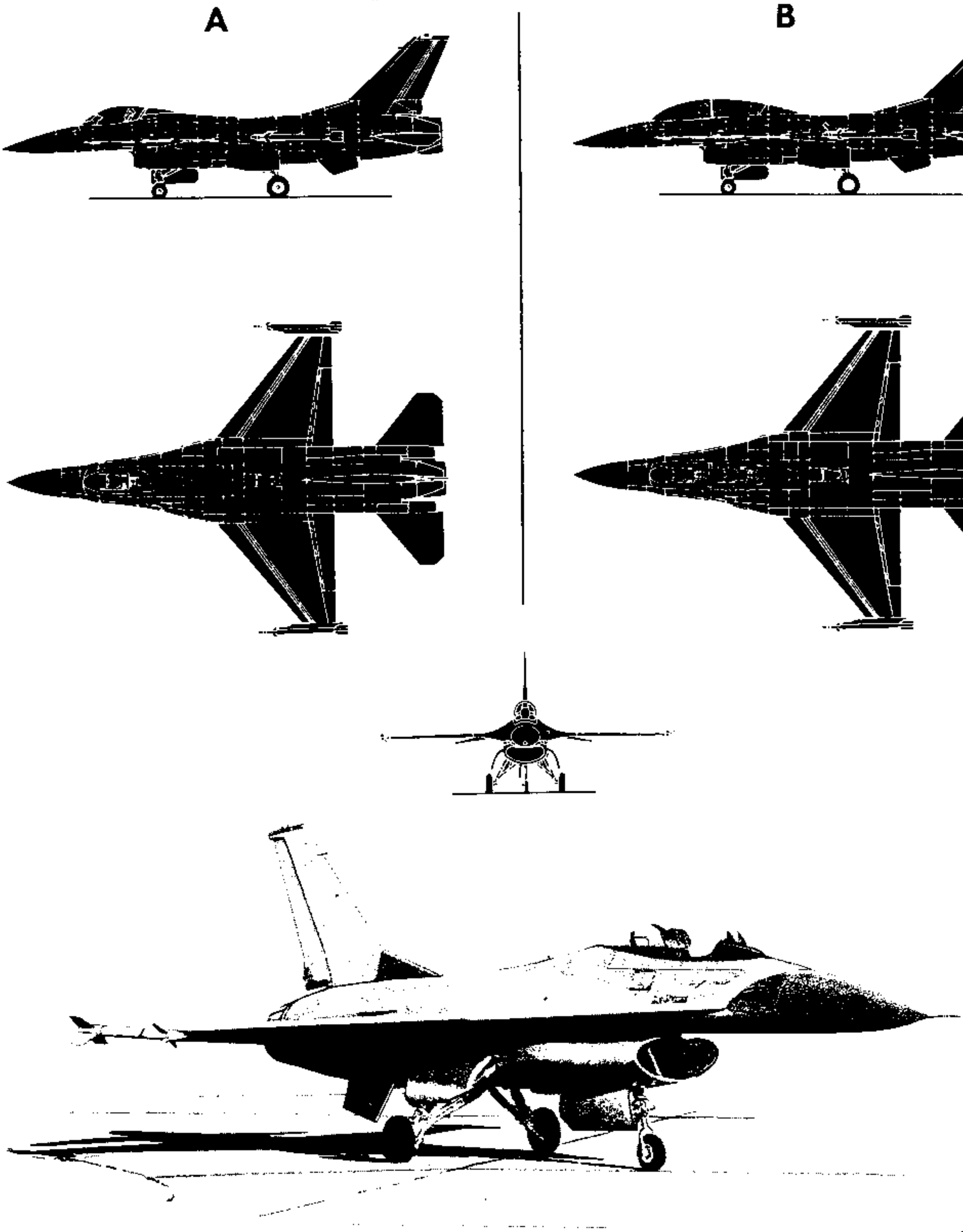
F-16
Fighting Falcon



1F-16A-1-0124

SECTION I
DESCRIPTION AND OPERATION

TABLE OF CONTENTS

THE AIRCRAFT

GENERAL DESCRIPTION

The F-16A is a single-engine, single-seat, multirole tactical fighter with full air-to-air and air-to-surface combat capabilities. The F-16B is a two-seat (tandem) version and performs the secondary role of a trainer. The fuselage is characterized by a large bubble canopy, forebody strakes, and an under fuselage engine air inlet. The wing and tail surfaces are thin and feature moderate aft sweep. The wing has automatic leading edge flaps which enhance performance over a wide speed range. Flaperons are mounted on the trailing edge of the wing and combine the functions of flaps and ailerons. The horizontal stabilizers have a small negative dihedral and provide pitch and roll control through symmetrical/differential deflection. The vertical tail, augmented by twin ventral fins, provides directional stability. All flight control surfaces are actuated hydraulically by two independent hydraulic systems that are directed by signals through a fly-by-wire system.

The fire control system includes a fire control radar with search and tracking capability, a radar electro-optical (REO) display, and a head-up display (HUD). A stores management system (SMS) presents a control panel and visual display for inventory, control, and release of all stores. Basic armament includes a fuselage-mounted multibarrel 20 mm gun and an air-to-air missile on each wingtip. Additional stores of various types can be carried on pylons mounted under the wings and on the fuselage centerline.

AIRCRAFT DIMENSIONS

The overall approximate dimensions (figure FO-2) of the aircraft are:

Span – including missile fins	– 32 feet 10 inches
Length – including nose probe	– 49 feet 6 inches
Height – top of vertical tail	– 16 feet 8 inches
– top of canopy	– 9 feet 4 inches
Tread	– 7 feet 9 inches
Wheelbase	– 13 feet 2 inches

Refer to figure 2-7 for TURNING RADIUS AND GROUND CLEARANCE.

AIRCRAFT GROSS WEIGHT (A/C GW)

The GW of the US A LESS 46 aircraft including pilot, oil, two tip missiles, and a full load of 20 mm ammo is approximately 16,500 pounds and with full internal fuel 23,500 pounds. 46 Aircraft is approximately 500 pounds heavier. Maximum GW is 35,400 pounds. These GW's are approximate and shall not be used for computing aircraft performance. Refer to Appendix 1 for detailed information.

GENERAL ARRANGEMENT

Aircraft and System Components

For general arrangement and overall view of the aircraft, refer to figure FO-1.

COCKPIT

The cockpit is conventional except for the seat, which is reclined 30 degrees, and the stick, which is mounted on the right console. The cockpit contains no circuit breakers. The instruments and control panels are shown in figure FO-3.

ENGINE

GENERAL DESCRIPTION

The aircraft is powered by a single F100-PW-200 afterburning turbofan engine. Refer to figure 1-1. Maximum thrust is approximately 25,000 pounds.

F100-PW-200 Engine

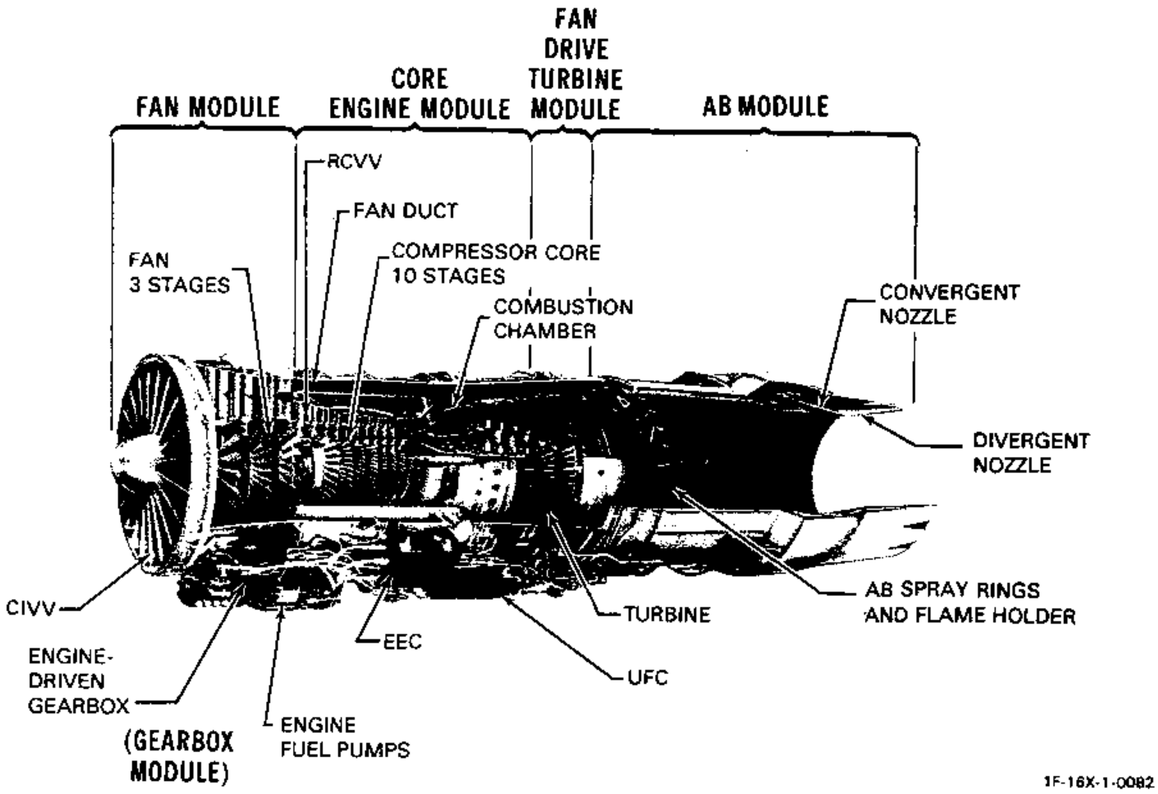


Figure 1-1.

ENGINE FUEL SYSTEM

The engine fuel system (figure FO-4) delivers the required fuel to the engine and schedules the engine variable geometry.

Unified Fuel Control (UFC)

Primary engine control is provided by a hydromechanical UFC.

The UFC contains the engine fuel control, the AB fuel control, the rear compressor variable vanes (RCVV) and start bleed controls, and the convergent nozzle area control.

Engine fuel flow is dependent upon throttle position, rotational speed of both compressors, combustion chamber pressure, fan turbine inlet temperature, and the presence of an engine stall recovery signal. The UFC is further trimmed by the EEC.

Electronic Engine Control (EEC)

The EEC is an engine-mounted, solid-state digital computer which is fuel cooled.

The EEC commands UFC trims of engine fuel flow and convergent nozzle area. The EEC controls the scheduling of the compressor inlet variable vanes (CIVV's) and provides signal inputs to the UFC for engine stall recovery, segment 5 AB lockout, AB ignition inhibit, and idle area reset.

The EEC closed-loop idle control trims the UFC idle fuel flow to maintain scheduled fan speed. This results in constant, repeatable idle thrust in flight and on the ground. To reduce the idle thrust level, the nozzle is commanded open when the throttle is at or near IDLE and the LG handle is DN.

The EEC limits minimum engine operation throughout the flight envelope to maintain stable operation. At high altitude, low airspeed conditions, the EEC protects against low thrust engine stalls. During transonic and supersonic conditions, the EEC limits minimum engine operation as a function of mach number (from the CADC) to provide sufficient engine airflow.

To minimize the possibility of stalls during AB operation at high altitude and low airspeed, the EEC commands termination of segment 5 AB. If an engine stall does occur in AB, the EEC automatically commands the engine to minimum AB (auto power retard) regardless of throttle position. Below AB, the EEC stall recovery logic is most effective with the throttle at MIL; at MIL, the EEC commands the UFC to open the nozzle to relieve excessive back pressure created by a stall. All these features are deactivated when the EEC is turned off.

An engine fan overspeed condition will cause the EEC to automatically turn off. The EEC cannot be reset in this case.

The EEC receives power directly from the engine alternator. In the event of engine alternator or engine gearbox failure indicated by rapid decrease to zero percent rpm, the EEC will be inoperative and the EEC caution light may not illuminate. The engine is operable without the EEC within certain limits (refer to Section III).

Backup Fuel Control (BUC) System

The BUC is a hydromechanical system which provides engine control in the event of a UFC malfunction. The BUC is selected by the EEC BUC switch. Fuel flow is scheduled only by throttle position, airspeed, and altitude.

Main Fuel Pump

The gearbox-mounted main fuel pump (figures 1-3 and FO-4) provides pressurized fuel to engine and boost pressure to the AB fuel pump.

Afterburner (AB) Fuel Pump

The AB fuel pump is driven by engine bleed air and provides pressurized fuel to the AB section of the UFC. The pump also provides pressurized fuel for hydraulic actuation of the CIVV's, the RCVV's, and the seventh-stage bleed valve.

Compressor Inlet Variable Vanes (CIVV's)

The CIVV's (figure 1-1) are located immediately forward of the first compressor stage. They are positioned by signals from the EEC using pressurized fuel from the AB fuel pump. In BUC, the CIVV's are in a fixed position.

Rear Compressor Variable Vanes (RCVV's)

The first three stages of the rear compressor (figure 1-1) are equipped with RCVV's. RCVV's are positioned by the UFC using pressurized fuel from the AB fuel pump. In BUC, the RCVV's are controlled by the throttle position.

Compressor Bleed Air

Seventh-stage bleed air is directed from the bleed strap into the fan duct to increase the compressor stall margin during starting. The bleed valve is actuated by the UFC using pressurized fuel from the AB fuel pump. In BUC, it is activated by throttle position. Seventh-stage bleed air is also used for engine inlet anti-icing.

Thirteenth-stage bleed air is supplied to the EPU. Both stages provide air to the ECS.

Pressurization and Dump Valve

A pressurization and dump valve (figure FO-4) is located in the engine fuel manifold line between the fuel-oil cooler and fuel nozzles. It provides a minimum fuel pressure for UFC operation at low rpm, enhances quick starting, and dumps the engine fuel manifold on shutdown.

EXHAUST NOZZLE

The exhaust nozzle is variable and consists of two sections. The divergent nozzle floats freely and moves in conjunction with the convergent nozzle. The convergent nozzle is controlled by the convergent exhaust nozzle control.

Convergent Exhaust Nozzle Control (CENC)

The CENC (figure 1-1) is activated by a motor driven by 13th-stage bleed air. The nozzle schedule is primarily controlled by the throttle position input to the UFC and trimmed by the EEC. With the LG handle down and EEC on, the nozzle is approximately 70-95 percent open at IDLE. As the throttle is advanced, the nozzle closes. With the LG handle up, the nozzle is near minimum area except when approaching MIL or above. At MIL and above, the EEC trims the nozzle to regulate engine back pressure to control fan speed. As the throttle is advanced in the AB range, the UFC opens the nozzle to compensate for increasing AB fuel flow. With the EEC off or inoperative, the nozzle is nearly closed on the ground or in flight and AB operation is not recommended. In BUC, the nozzle is not scheduled by the CENC but is aerodynamically loaded toward the closed position; therefore, AB operation is prohibited.

ENGINE OIL SYSTEM

The engine is equipped with a self-contained oil system to lubricate the engine and gearbox. System pressure is nonregulated and varies with rpm and oil temperature. Refer to figure 1-67 for servicing/specifications information.

ENGINE ANTI-ICE SYSTEM

The anti-ice system routes bleed air from the seventh-stage compressor to and through the fixed inlet guide vanes and the nose cone to prevent ice formation. The system is controlled by a three-position ANTI-ICE switch (figure 1-2). The anti-ice system can be activated manually or automatically by an ice detector in the engine inlet. The inlet strut is electrically heated to prevent ice buildup. The heater is activated by the engine ANTI-ICE switch.

Engine ANTI-ICE Switch

The engine ANTI-ICE switch (figure 1-2) is located on the right console.

Functions are:

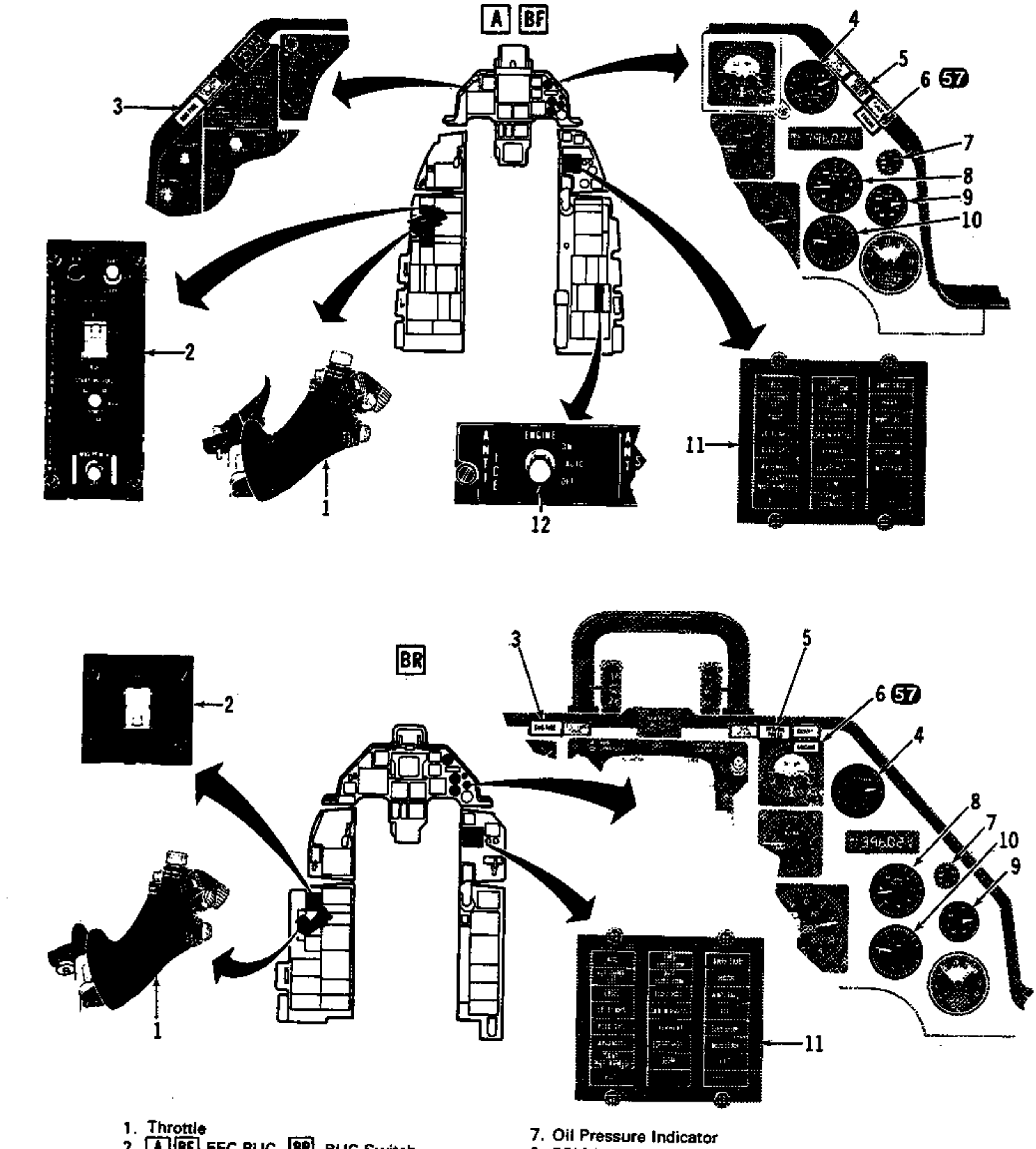
- ON – Seventh-stage bleed air is directed to the fixed inlet guide vanes and nose cone. The inlet strut electrical heater turns on.
- AUTO – When engine icing is detected by the icing detector (automatic detection may not occur on the ground or above 7 degrees AOA), seventh-stage bleed air is directed to the fixed inlet guide vanes and nose cone and the inlet strut electrical heater turns on.
- OFF – Electrical power closes the engine anti-ice valve (loss of power opens the valve). The inlet strut heater is turned off.

ENGINE AND ACCESSORY DRIVE GEARBOXES

The engine gearbox (figure 1-3) drives the main fuel pump, the oil pump assembly, the engine alternator, and the PTO shaft, which powers the accessory drive gearbox (ADG).

Engine Controls and Indicators (Typical)

BLOCK 10



1. Throttle
2. A BF EEC BUC BR BUC Switch
3. ENG FIRE Warning Light
4. Fuel Flow Indicator
5. HYD/OIL PRESS Warning Light
6. 57 ENGINE Warning Light
7. Oil Pressure Indicator
8. RPM Indicator
9. Nozzle Position Indicator
10. FTIT Indicator
11. Caution Light Panel
12. ANTI-ICE Switch

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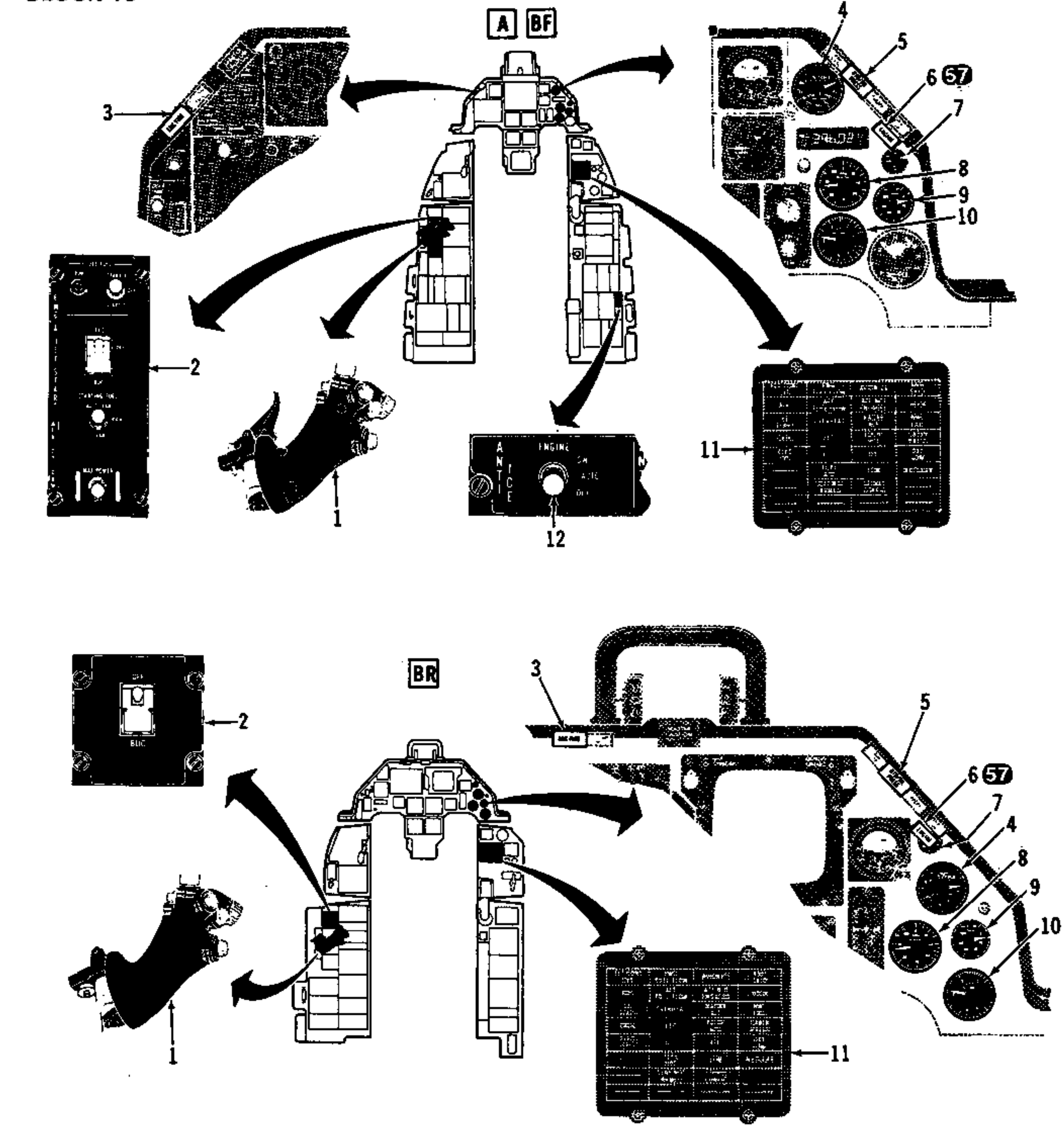
Figure 1-2. (Sheet 1)

Engine Controls and Indicators (Typical)

BLOCK 15



1. Throttle
2. A BF EEC BUC BR BUC Switch
3. ENG FIRE Warning Light
4. Fuel Flow Indicator
5. HYD/OIL PRESS Warning Light
6. 57 ENGINE Warning Light
7. Oil Pressure Indicator
8. RPM Indicator
9. Nozzle Position Indicator
10. FTIT Indicator
11. Caution Light Panel
12. ANTI-ICE Switch

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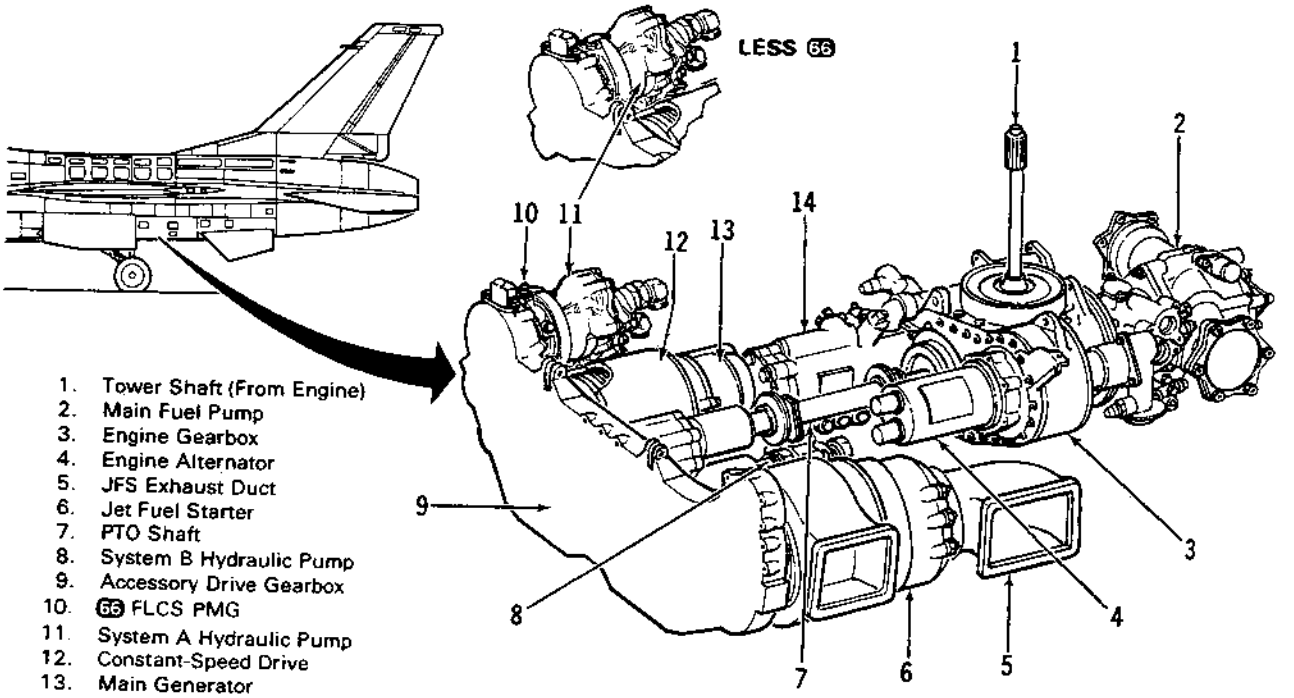
Figure 1-2. (Sheet 2)

Engine and Accessory Drive Gearbox



1. Tower Shaft (From Engine)
2. Main Fuel Pump
3. Engine Gearbox
4. Engine Alternator
5. JFS Exhaust Duct
6. Jet Fuel Starter
7. PTO Shaft
8. System B Hydraulic Pump
9. Accessory Drive Gearbox
10. 66 FLCS PMG
11. System A Hydraulic Pump
12. Constant-Speed Drive
13. Main Generator
14. Engine Oil Pump

Figure 1-3.

The ADG (figure 1-3) powers the main generator, system A and B hydraulic pumps, and 66 FLCS PMG. The JFS is also mounted on the ADG.

ENGINE ALTERNATOR

The engine alternator (figure 1-3) is driven by the engine gearbox and provides sole power for the EEC, engine and AB ignition, and the rpm signal to the rpm indicator.

ENGINE IGNITION SYSTEM

The ignition system is powered by the engine alternator and contains three igniter plugs (two for the engine and one for the AB). With the throttle at or above IDLE and rpm above 15 percent, engine ignition is continuous. When the throttle is moved into AB, AB ignition is activated for approximately 1 second. For subsequent AB ignition, the throttle must be retarded to MIL or below for a minimum of 1.5 seconds and then returned to AB.

JET FUEL STARTER (JFS)

The JFS (figure 1-3) is a gas turbine which operates on aircraft fuel and drives the engine through the ADG. The JFS receives fuel at all times regardless of the FUEL MASTER switch position. The JFS is started by power from two hydraulic accumulators used either singly or together. The accumulators are charged automatically by hydraulic system B or manually by a hydraulic hand pump located in the left wheel well. Automatic recharging may take up to 1 minute. The JFS is used to start the engine on the ground and to assist in engine airstart. Refer to figure 5-5 for limitations.

JFS Switch [A] [BF]

The JFS switch (figure 1-4) is located on the left console.

Functions are:

- OFF – Normal switch position. The JFS can be shut down at anytime by selecting OFF. The switch will return to OFF automatically during a normal ground start at 50 percent rpm.
- START 1 – Vents one of the hydraulic accumulators to the hydraulic start motor.
- START 2 – Vents both hydraulic accumulators to the hydraulic start motor. This position is used for ground starts in extreme temperatures or after a start 1 failure. START 2 is also used for JFS-assisted airstarts.

Engine and Jet Start Control Panel (Typical)

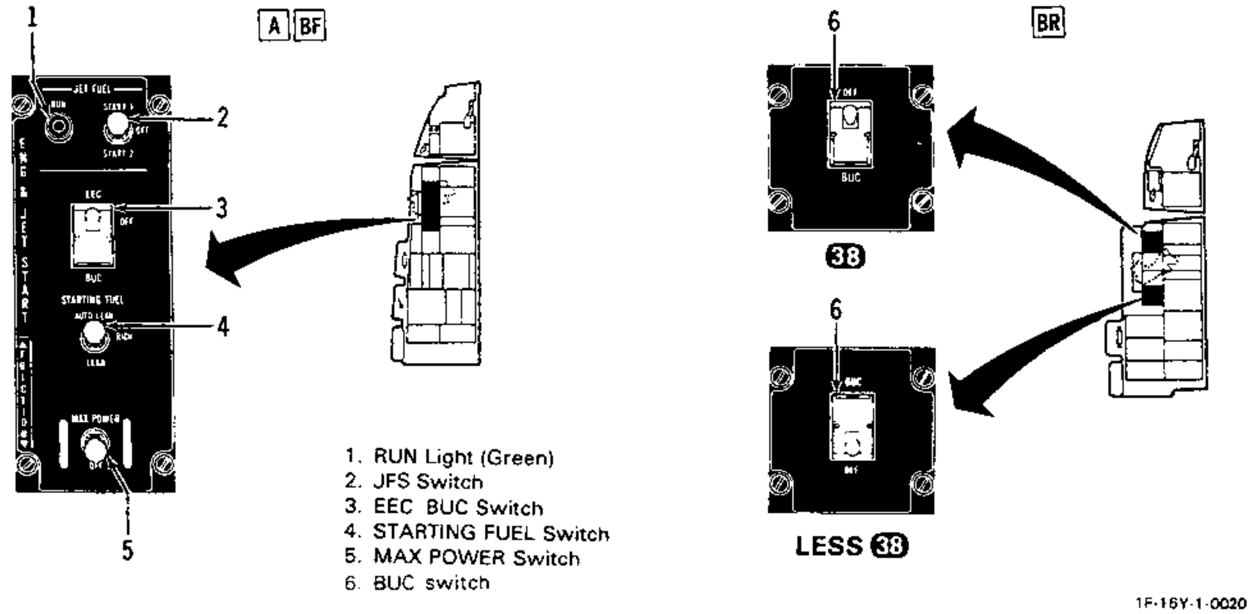


Figure 1-4.

JFS RUN Light A BF

The JFS RUN light (figure 1-4) illuminates green within 30 seconds after initiating JFS start to indicate that the JFS has attained governed speed.

JFS Operation

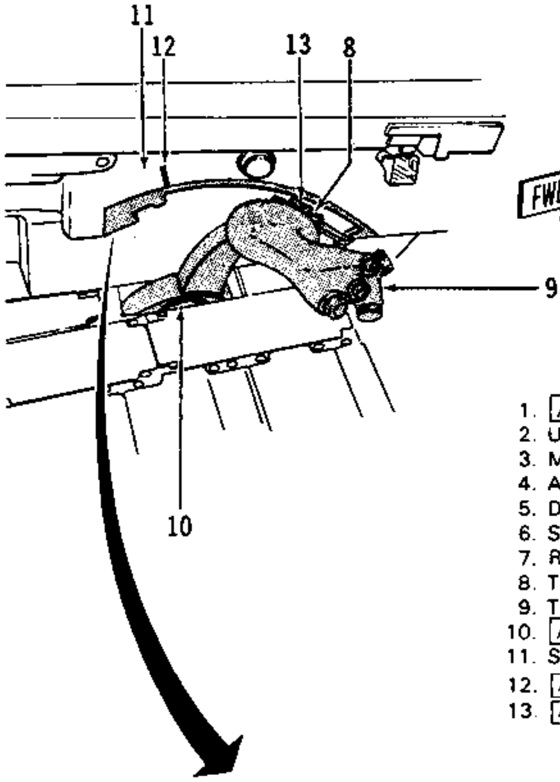
On the ground, as the engine accelerates through 50 percent rpm, a sensor causes the JFS to shut down automatically and the JFS RUN light goes off. During in-flight operation of the JFS, the unit and light remain on until the switch is manually positioned to OFF. If the JFS RUN light does not illuminate within 30 seconds or the JFS RUN light goes off once illuminated, the JFS START switch will not reengage, and the JFS cannot be restarted until the JFS has spooled down. This spooldown takes approximately 17 seconds from full governed speed.

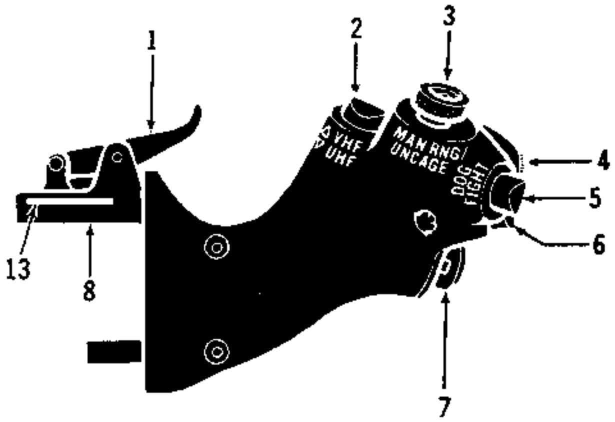
ENGINE CONTROLS AND INDICATORS

Throttle

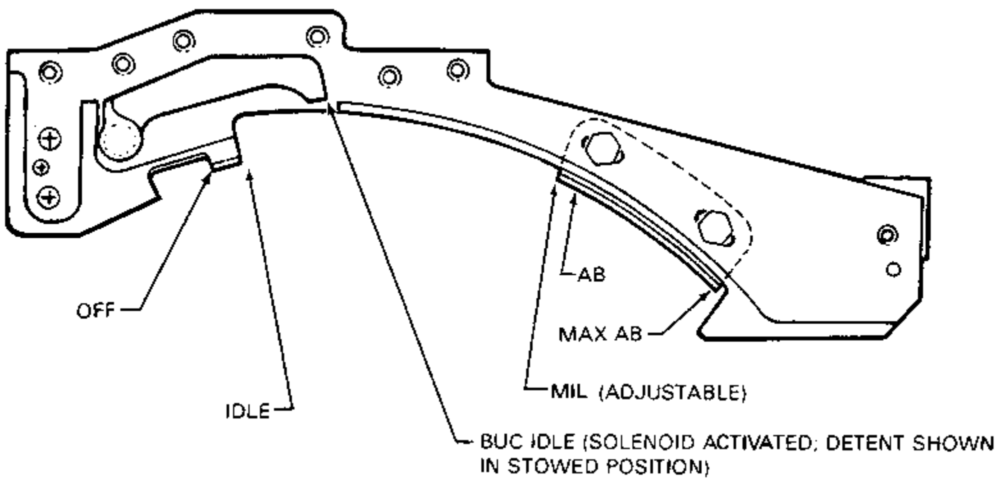
The engine is controlled by a throttle (figure 1-5) mounted above the left console with detents at OFF, IDLE, MIL, and MAX AB. The throttle is mechanically connected to the UFC/BUC. The OFF position terminates engine ignition and fuel flow. The IDLE position commands minimum UFC thrust and is used for all ground starts and BUC airstarts. From IDLE to MIL, the throttle controls the output of the engine. Forward of the MIL position, the throttle modulates the operation of the AB (through five segments) while maintaining constant basic engine operation. When BUC is selected, a BUC IDLE detent drops into place forward of IDLE. Throttle travel from IDLE to BUC IDLE provides a manual BUC starting schedule. Then the BUC IDLE detent is used to command minimum BUC thrust.

Throttle Quadrant (Typical)





1. A BF Cutoff Release
2. UHF VHF Transmit Switch (2-Way, Momentary Rocker)
3. MAN RNG/UNCAGE Knob/Switch (Rotate, Depress)
4. ANT ELEV Knob (Rotate, Center Detent)
5. DOG FIGHT Switch (3-Position, Slide)
6. SPD BRK Switch (3-Position, Aft Momentary)
7. RDR CURSOR/ENABLE Switch (Depress, Multidirectional)
8. Throttle Foot
9. Throttle
10. A BF Throttle Friction Control
11. Sidewall Fairing
12. A BF IDLE Stripe
13. A BF Throttle Stripe



NOTE:
BR For throttle differences, refer to THROTTLE and F-16B AIRCRAFT, this section

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Figure 1-5.

The throttle must be rotated upward and outward to allow movement from OFF to IDLE and from MIL to AB. Reduction from AB to MIL automatically rotates the throttle. At IDLE, the throttle must be rotated outward and a cutoff release at the base of the throttle actuated to move the throttle to OFF.

A BF A single white reflective stripe is located on the upper surface of the throttle foot (BR on the lower throttle radius next to the console).

A BF A single reflective stripe on the sidewall fairing (BR on the panel outboard of the throttle radius) is located at the IDLE position. Alignment of the throttle stripe with the IDLE stripe aids in identifying exact throttle position during BUC starts.

Six switches are located on the throttle. A BF A throttle friction control is located inboard at the base of the throttle. B The throttles are mechanically linked together.

EEC BUC Switch A BF

The EEC BUC switch (figure 1-4) (guarded out of BUC) is located on the left console.

Functions are:

- EEC – EEC in operation (normal position).
- OFF – EEC not in use (basic UFC operation).
- BUC – BUC operation. 80 Transfer occurs when throttle is in OFF or at or above BUC IDLE. **LESS** 80 If rpm is above 52 percent and throttle position is at or above BUC IDLE, transfer to BUC occurs. If rpm is below 52 percent, transfer occurs regardless of throttle position.

EEC Caution Light

The EEC caution light (figure FO-15) is located on the caution light panel and indicates an EEC self-failure or input failure.

The EEC caution light also illuminates in conjunction with the CADC caution light if the malfunction affects the mach number signal. The EEC caution light will illuminate if the EEC BUC switch is in OFF or BUC or if an engine overspeed condition occurs.

BUC Caution Light

The BUC caution light (figure FO-15) is located on the caution light panel and illuminates when the engine is operating on BUC or when main fuel pump pressure is low.

BUC GND TEST Button A BF

The BUC GND TEST button (figure FO-3) is located aft of the stick and 80 is inoperative. **LESS** 80 When depressed, it allows transfer to BUC on the ground when the throttle is below BUC IDLE. The button is normally used only for ground maintenance checks.

STARTING FUEL Switch A BF

The STARTING FUEL switch (figure 1-4) is located on the left console.

Functions are:

- AUTO LEAN – In UFC (EEC on or off), lean fuel flow is provided during the engine start cycle until 30 seconds after the main generator comes on the line. Fuel flow then increases by 100 pph (rich fuel flow). In BUC, rich starting fuel flow is provided.
- RICH – Fuel flow is rich at all times.
- LEAN – Fuel flow is lean at all times.

A lean fuel mixture is required during both UFC ground starts and airstarts. Rich fuel mixture is required for BUC starts.

MAX POWER Switch

The MAX POWER switch (figure 1-4) is located on the left console. The switch is solenoid held in the MAX POWER position only when the throttle is in MAX AB. MAX POWER allows the maximum FTIT to increase by 22°C. Refer to ENGINE LIMITATIONS, Section V.

Functions are:

- MAX POWER – Delivers maximum thrust (VMAX) when at 1.1 mach or above and the throttle is at MAX AB.
- OFF – Normal (deenergized) position.

REDUCED IDLE THRUST (RIT) Switch

The RIT switch (figure FO-3), located on the left sidewall just aft of the throttle, is deactivated.

ENGINE INSTRUMENTS

The engine instruments (figure 1-2) are located on the right side of the instrument panel. Refer to ENGINE LIMITATIONS, Section V.

RPM Indicator

The rpm indicator (figure 1-2) has a pointer display and the rpm signal is supplied by the engine alternator. RPM is expressed in percent from 0-100. The indicator is powered by the battery bus.

Nozzle Position (NOZ POS) Indicator

The NOZ POS indicator (figure 1-2) is not a direct reading gage but displays CENC commands ranging from 0 percent (closed) to 100 percent (open). The indicator is powered by essential ac bus No. 2.

Fan Turbine Inlet Temperature (FTIT) Indicator

The FTIT indicator (figure 1-2) displays an average FTIT in degrees C. The instrument is scaled over a range of 200°-1200°C in major increments of 100°C. The indicator is powered by the battery bus.

Fuel Flow (FF) Indicator

The FF indicator (figure 1-2) is a pointer-counter instrument that displays the total FF to the engine, including AB, in pph. The instrument is scaled 0-80,000 pph and is powered by essential ac bus No. 1.

Oil Pressure Indicator

The oil pressure indicator (figure 1-2) displays engine oil pressure from 0-100 psi. It is powered by essential ac bus No. 2.

HYD/OIL PRESS Warning Light

The HYD/OIL PRESS warning light (figure 1-2), located on the edge of the right glareshield, serves as a monitor of engine oil pressure and hydraulic system pressure. The light illuminates when the engine oil pressure drops below 10 (±2) psi. For the oil pressure function only, there is a 57 30-second (LESS 57 10-second) time delay in the light circuit to minimize transient lights during negative g maneuvers. During engine start, the light will usually go off before reaching idle rpm; however, acceptable operation is indicated if the light goes off before exceeding 70 percent rpm and remains off when the throttle is reduced to idle. The warning light also comes on as a function of hydraulic system pressure. Refer to HYDRAULIC SYSTEM, this section.

ENGINE Warning Light 57

The ENGINE warning light (figure 1-2), located on the edge of the glareshield, serves as a monitor of FTIT and rpm indications to warn of an engine overtemperature, flameout, or stagnation. The ENGINE warning light does not function with WOW. During in-flight operations, the ENGINE warning light illuminates when the rpm decreases to subidle (below 55 percent), when engine stagnates, or approximately 2 seconds after FTIT indicator reaches 1000°C. The ENGINE warning light will go off when the condition that turned it on is eliminated or the WOW switch is activated. The ENGINE warning light is powered by the battery bus.

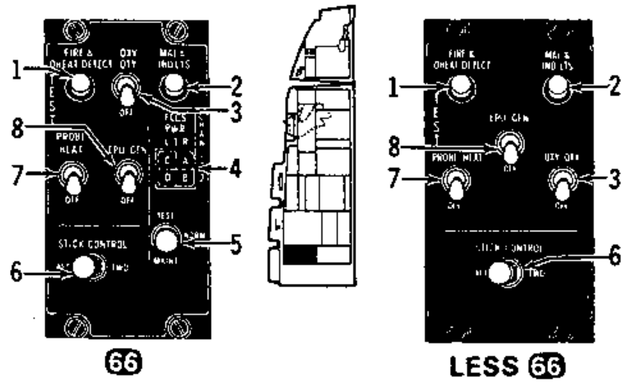
ENGINE FIRE AND OVERHEAT DETECTION SYSTEM

The fire and overheat detection system consists of two separate parallel loop sensing systems, one for fire and the other for overheat. The fire detection loops are routed through the engine compartment. The overheat detection loops are routed through the engine compartment, wheel well, ECS bay, and EPU bay. Activation of the overheat detection loops occurs approximately 100°C below the activation temperature of the fire detection loops. The fire warning signal causes the ENG FIRE warning light to illuminate. The overheat signal causes the OVERHEAT caution light to illuminate. When the temperature of the element drops below the critical temperatures, the signal ceases, allowing the ENG FIRE warning or the OVERHEAT caution light to go off. The detection circuit requires power from both the ac essential bus No. 2 and the battery bus for operation.

Engine Fire and Overheat Detection Test Button A BF

The engine fire and overheat detection test button (figure 1-6) is located on the test switch panel. Depressing the FIRE & OHEAT DETECT button checks continuity of both systems and illuminates the ENG FIRE warning light and the OVERHEAT caution light.

Test Switch Panel A BF (Typical)



1. FIRE & OHEAT DETECT Test Button
2. MAL & IND LTS Test Button
3. OXY QTY Indicator Test Switch
4. FLCS PWR Lights
5. FLCS PWR TEST Switch
6. BF Stick Selector (STICK CONTROL) Switch
7. PROBE HEAT Switch
8. EPU/GEN Test Switch

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Figure 1-6.

ENGINE OPERATING CHARACTERISTICS

Ground Operations

During ground operation, closed loop idle can be verified by observing rpm and FTIT during EEC cycling. RPM should decrease and FTIT should rise approximately 30°C when the EEC is turned off. When the EEC is turned back on, do not mistake the slight increase of about 1/2 percent in rpm associated with the nozzle coming open as closed loop idle. Closed loop idle may take up to 1 minute after EEC cycling. FTIT should then return to its previous EEC on level. Since the EEC maintains constant IDLE thrust, rpm will vary with temperature and pressure altitude (higher temperature or pressure altitude results in higher rpm).

Non-AB Operation in Flight

After a MIL takeoff, engine FTIT will usually be 900°-950°C with rpm of 89-94 percent for any outside air temperature above -7°C. FTIT and rpm will be lower for temperature below -7°C. Regardless of temperature, nozzle area should not exceed 30 percent at MIL.

At low altitudes (below approximately 10,000 feet), idle rpm should always be equal to or slightly higher than the ground idle rpm. As altitude increases, idle rpm increases to provide the engine sufficient stall margin during throttle transients. At 1.4 mach and above, the minimum thrust level is MIL even though the throttle may be retarded below MIL. Typically, the minimum thrust level increases from IDLE to MIL between 0.84-1.4 mach. All of the minimum operating level features are deactivated when the EEC is turned off.

On the ground and at low altitude, oil pressure should rise approximately 15 psi from IDLE to MIL. At very high altitudes (50,000 feet), the oil pressure rise will be approximately 5 psi from IDLE to MIL. At all altitudes, however, a definite oil pressure rise should be evident when the throttle is advanced.

AB Operation in Flight

In AB, FTIT, rpm, and oil pressure vary with altitude and airspeed. Nozzle position at MAX AB during subsonic operation will be approximately 75 percent. During supersonic acceleration, the nozzle opens to maintain the proper fan speed.

When climbing or decelerating into the segment 5 lockout region (figure 5-3), nozzle position decreases from approximately 75-60 percent with an associated thrust and fuel flow decrease. When descending or accelerating from the segment 5 lockout zone, nozzle position increases from approximately 60-75 percent with a corresponding increase in thrust and fuel flow.

AB rumble (figure 5-3) may occur in segment 5 in an area just below the segment 5 lockout line. If rumble is experienced, an AB blowout and/or stall may result. Retarding throttle should eliminate the rumble.

Methods to improve AB operation in flight are:

- Stabilizing at MIL prior to initiating AB.
- Snap cancellations from AB are better than slow cancellations since control system logic will open nozzle area 10 percent larger than normal during snaps, thus providing more engine stall margin.
- Throttle transients to AB are more successful if made before aircraft maneuvers rather than during maneuvers.

BUC Operation

80 The engine will transfer to BUC when the EEC BUC switch is placed to BUC and the throttle is in OFF or if it is at or above BUC IDLE.

LESS 80 The engine will transfer to BUC when the EEC BUC switch is placed to BUC regardless of throttle position if rpm is less than 52 percent. If the engine is operating above 52 percent, transfer will occur only if the throttle is above BUC IDLE.

When the engine transfers to BUC, the BUC caution light illuminates.

When starting in BUC, the starting fuel schedule is rich with the STARTING FUEL switch in either AUTO LEAN or RICH. LEAN is available but degrades airstart capability and safe idle operation.

When transferring to BUC with the engine running, rpm and FTIT may either increase or decrease depending on throttle setting and flight conditions.

The simplicity of the BUC restricts its operating envelope (refer to OPERATING LIMITATIONS, Section V) and requires smooth and slow throttle movements (5 seconds through the BUC IDLE to MIL range). Since the engine is not trimmed by the EEC when in BUC, MIL rpm can exceed 96 percent at low altitude on a hot day and must be monitored to prevent the rpm from exceeding 96 percent.

The nozzle is aerodynamically loaded to the closed or near closed position at all times when operating in BUC; therefore, AB selection will result in an engine stall and should not be attempted. Above 25,000 feet MSL, aerodynamic loading may not be sufficient to completely close the nozzle. When descending at higher thrust settings, the nozzle may close.

MIL thrust in BUC is approximately 60 percent of that in UFC. On cold days, landing thrust at BUC IDLE will be appreciably higher than that in UFC.

FUEL SYSTEM

The fuel system is divided into seven functional categories. These are the fuel tank system, fuel transfer system, fuel tank vent and pressurization system, engine fuel supply system, fuel quantity/fuel level sensing system, fuel tank explosion suppression system, and refueling/defueling system. Refer to figures FO-5 and FO-6 for system schematics and figure 1-7 for a simplified system diagram.

FUEL TANK SYSTEM

The aircraft has seven internal fuel tanks located in the fuselage and wings that are integral to the structure. There are provisions for carrying three external tanks on the wings and the centerline station. Refer to figure 1-8 for tank locations and capacities. Five of the internal tanks are storage tanks: the left and right wing tanks, two forward F-1 and F-2 fuselage tanks, and the aft A-1 fuselage tank. The two forward and aft internal reservoir tanks supply fuel directly to the engine. B The forward F-1 fuel tank is reduced in size to allow room for the rear cockpit.

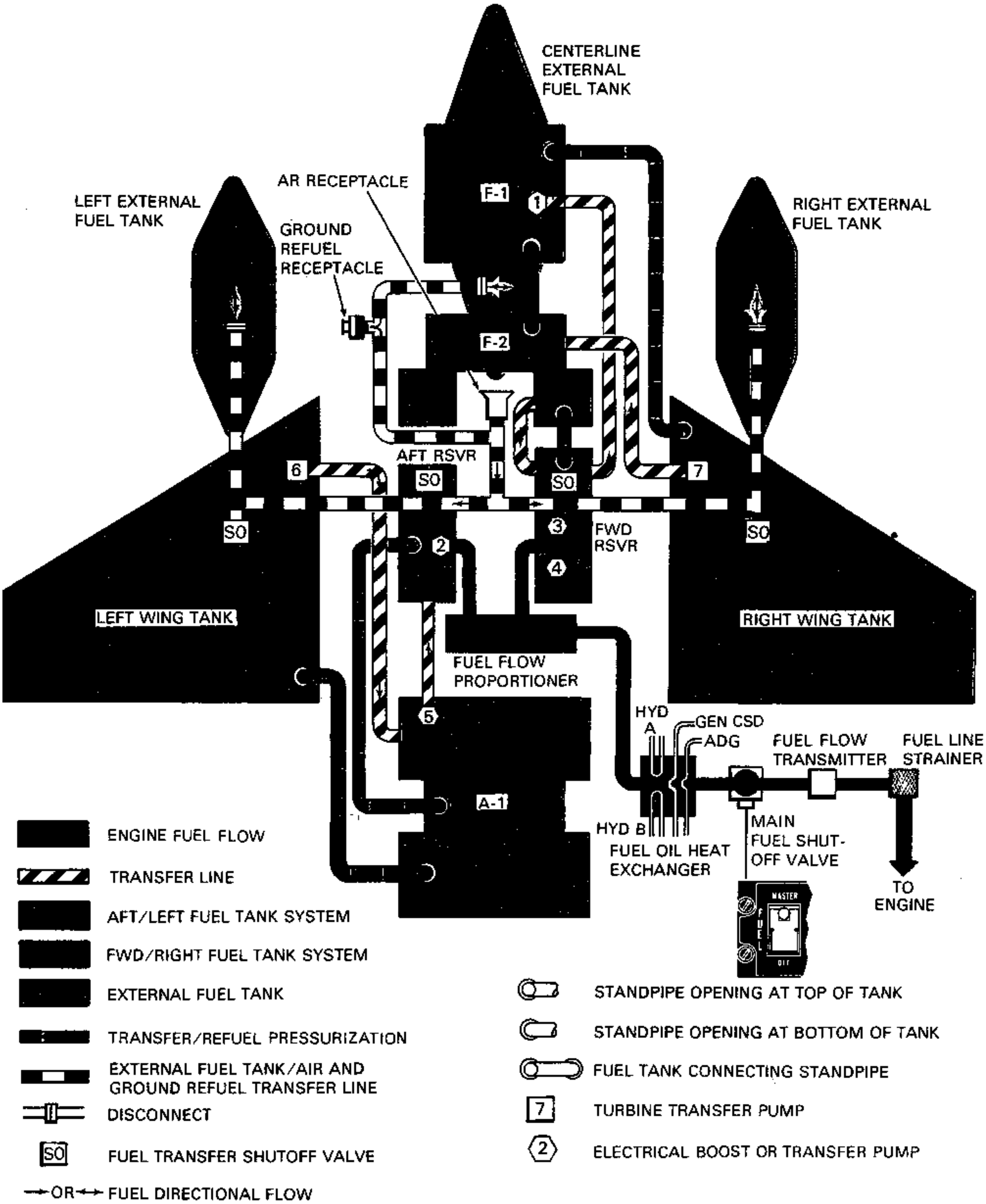
FUEL TRANSFER SYSTEM

Fuel is transferred by two independent methods. The primary method provides a siphoning action through standpipes connecting the fuel tanks. Siphoning action depends on the absence of air in the bays receiving fuel. Air ejectors in each reservoir tank automatically expel air. In case of failure of the siphoning system, powered fuel pumps work continually to pump fuel from the internal tanks to the reservoirs. The powered transfer system also scavenges tanks to minimize unusable fuel by using electrically driven pumps and pumps powered by bleed fuel pressure from the engine manifold. Both methods operate simultaneously and independently to transfer fuel through the system.

The transfer system is divided into two separate tank systems, the forward and the aft. The forward system consists of right external tank (if installed), right internal wing tank, F-1, F-2, and forward reservoir. The aft system consists of left external tank (if installed), left internal wing tank, A-1, and aft reservoir. If a centerline tank is installed, it is considered to be part of both forward and aft systems. The wing external tanks empty into the respective internal wing tanks. Fuel flows from the internal wing tanks to the fuselage tanks and then to the forward and aft reservoirs. Fuel is pumped to the engine from the reservoirs. To automatically maintain the CG, fuel is transferred through the forward and aft systems simultaneously.

If external tanks are installed, air pressure transfers fuel to the internal wing tanks. If the EXT FUEL TRANS switch is in the NORM position (figure 1-10), the sequence of fuel flow is from the centerline tank to the internal wing tanks. After the centerline tank empties, each external wing tank flows to its respective internal wing tank.

Fuel Tank System — A



NOTE: This is a simplified diagram. Not all fuel system items are shown (crossfeed, motive flow, etc). Refer to FO Section for complete schematic.

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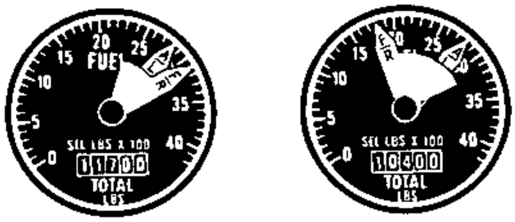
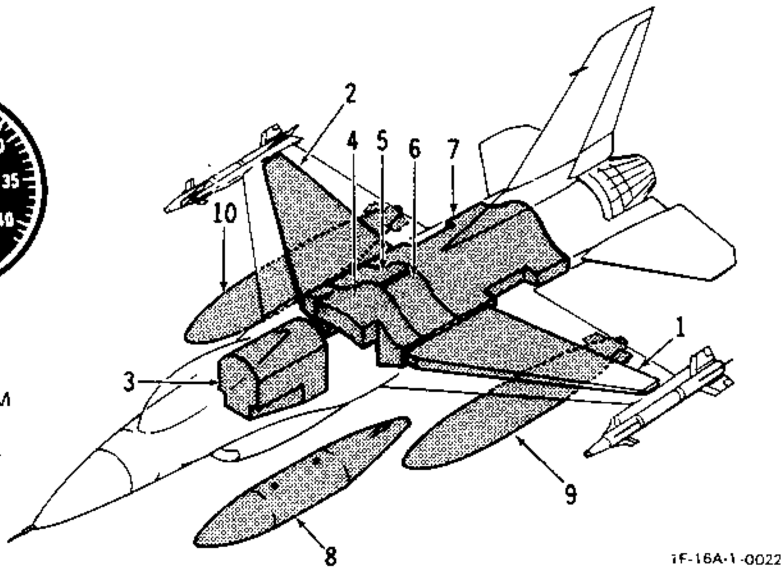
Figure 1-7.

Fuel Quantity Indication and Tank Arrangement



A B

FUEL QUANTITY INDICATIONS WITH NORM SELECTED AND FULL INTERNAL TANKS WITH TWO FULL EXTERNAL WING TANKS.



TANK LOCATION	FUEL QTY SEL KNOB SETTINGS	POINTER	A		B	
			USABLE FUEL QTY (LB) JP-4	USABLE FUEL QTY (LB) JP-5/8	USABLE FUEL QTY (LB) JP-4	USABLE FUEL QTY (LB) JP-5/8
1. LEFT WING INTERNAL 2. RIGHT WING INTERNAL	INT WING INT WING	AL FR	525 ± 100 525 ± 100	550 ± 100 550 ± 100	525 ± 100 525 ± 100	550 ± 100 550 ± 100
3. F1 FUSELAGE 4. F2 FUSELAGE 5. FWD RESERVOIR	NORM	FR	3100 ± 100	3250 ± 100	1800 ± 100	1890 ± 100
6. AFT RESERVOIR 7. A1 FUSELAGE	NORM	AL	2800 ± 100	2940 ± 100	2800 ± 100	2940 ± 100
5. FWD RESERVOIR 6. AFT RESERVOIR	RSVR RSVR	FR AL	460 ± 30 460 ± 30	480 ± 30 480 ± 30	460 ± 30 460 ± 30	480 ± 30 480 ± 30
8. EXTERNAL CENTERLINE 9. LEFT EXTERNAL WING 10. RIGHT EXTERNAL WING	EXT CTR EXT WING EXT WING	FR AL FR	1800 ± 100 2400 ± 100 2400 ± 100	1890 ± 100 2520 ± 100 2520 ± 100	1800 ± 100 2400 ± 100 2400 ± 100	1890 ± 100 2520 ± 100 2520 ± 100
TOTAL INTERNAL FUEL			6950 ± 300	7300 ± 300	5650 ± 300	5930 ± 300
TOTAL EXTERNAL FUEL			6600 ± 300	6930 ± 300	6600 ± 300	6930 ± 300

NOTES:

1. These weights are based on JP-4 fuel at 6.5 pounds per gallon and JP-5/8 fuel at 6.8 pounds per gallon (standard day only).
2. Tolerances are due to indication errors with the variations in density resulting from temperatures, additives, etc.
3. The quantity of wing fuel varies depending upon aircraft attitude during refueling.
4. Usable fuel and indicated fuel quantities are approximately equal.

Figure 1-8.

The external tank fuel transfer valve in each internal wing tank shuts off fuel to prevent overfilling the internal tanks. If one of these valves fails, a float switch senses fuel and shuts off all external tank fuel transfer before fuel flows overboard. By placing the EXT FUEL TRANS switch to WING FIRST, the external wing tanks empty before the centerline tank, and the float switch does not prevent fuel from spilling overboard if a transfer valve fails.

The automatic forward fuel transfer system supplements the function of the FFP by preventing undesirable aft CG. The system operates only when the FUEL QTY SEL knob is in NORM and the total forward fuselage fuel quantity indication is less than 2800 (B 1500) pounds. In the A, forward fuel transfer starts when the forward heavy differential drops below 300 pounds and stops when the forward heavy fuel differential reaches 450 pounds. In the B, forward fuel transfer starts when the aft heavy differential exceeds 900 pounds and stops when the aft heavy fuel differential reaches 750 pounds. This system will not correct a forward fuel imbalance since it only transfers fuel from aft to forward.

For proper operation, the automatic forward fuel transfer system depends on a properly functioning fuel quantity indicating system. Fuel is transferred through a solenoid-operated trim valve powered from essential dc bus No. 2. If electrical power is lost through failure or by moving the FUEL QTY SEL knob out of NORM, the automatic system is deactivated.

FUEL TANK VENT AND PRESSURIZATION SYSTEM

The fuel tank vent and pressurization system supplies cooled pressurized air from the ECS to force fuel from the external tanks to the internal wing tanks and to power the air ejector pumps whenever the AIR SOURCE knob is in the NORM or DUMP position. It also prevents fuel in internal tanks from vaporizing at high altitude. An external tank vent and pressurization valve reduces pressure supplied to the external tanks.

If the combat schedule (reduced pressure) is activated by the TANK INERTING switch (figure 1-9), Halon is mixed with air and the internal tank vent and pressurization valve controls the pressure.

If the AIR SOURCE knob is placed in OFF or RAM or if the ECS is inoperative, tank pressurization will not be available and external fuel cannot be transferred.

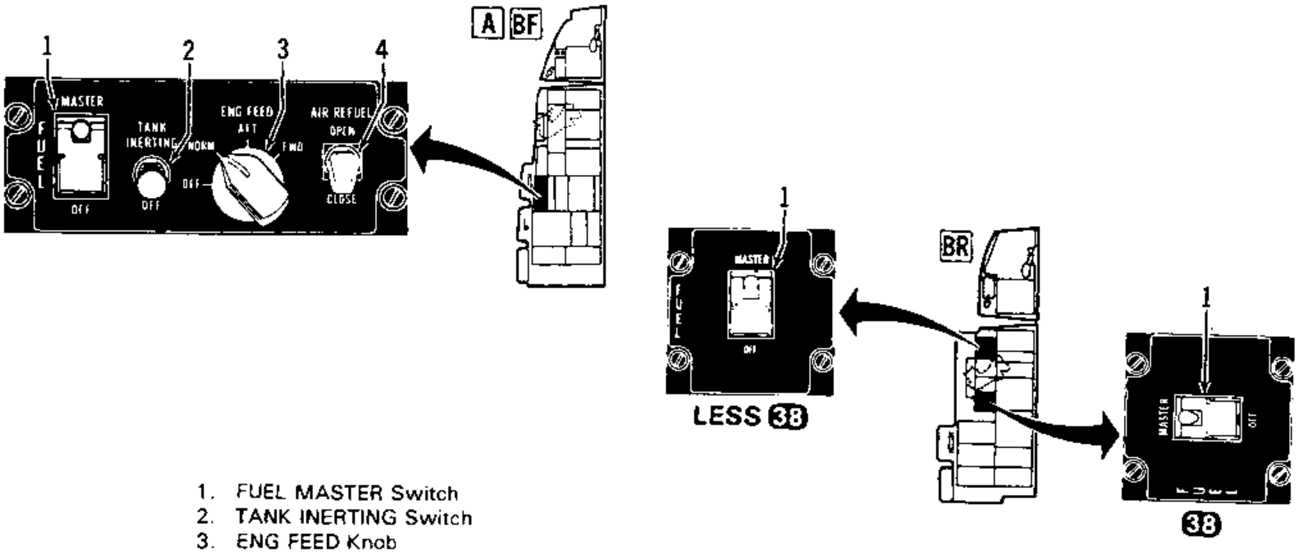
ENGINE FUEL SUPPLY SYSTEM

When the ENG FEED knob is in NORM (figure 1-9), boost pumps in the forward and aft reservoirs pump the fuel through the engine feedline to the fuel flow proportioner (FFP). In the FFP, twin constant-displacement pumps, powered by hydraulic system A, supply equal amounts of fuel from each reservoir to maintain CG. Two fuel lines with check valves can bypass the FFP in case it fails so that fuel flow will not be interrupted. After fuel flows through the FFP, a small amount of cooling fuel is routed to the EEC and then returned to the reservoirs. The remainder of the fuel passes through an oil-to-fuel heat exchanger to cool hydraulic systems A and B, the main generator, and the ADG. Then fuel flows through an electric fuel shutoff valve which has a full travel time of 2-4 seconds and is controlled by the FUEL MASTER switch. (**LESS** 73 The main fuel shutoff valve is safety-wired open and the FUEL MASTER switch is deactivated.) (The JFS receives fuel at all times regardless of the FUEL MASTER switch position.) After passing through the engine fuel shutoff valve, fuel passes through the fuel flow transmitter (which operates the FF indicator) to the engine. Refer to figure 1-9 for fuel system controls and operation.

FUEL QUANTITY/FUEL LEVEL SENSING SYSTEM

The fuel quantity/fuel level sensing system indicates the amount and location of fuel remaining. Refer to figure 1-10 for functions of the totalizer and pointers. The totalizer shows all fuel in the internal and external tanks in pounds. The AL and FR pointers show the fuel quantity in the tanks as selected by the FUEL QTY SEL knob (figure 1-10). The selected tanks should normally be the fuselage tanks (FUEL QTY SEL knob in NORM). The difference between the forward and aft tanks should remain essentially constant since the FFP maintains an equal flow of fuel. A Normally, the forward tank fuel quantity is 0-600 pounds greater than the aft tank quantity. B Normally, the aft tank fuel quantity is 700-1350 pounds greater than the forward fuel quantity. If this limit is exceeded, a red portion of the AL pointer becomes visible. Fuel distribution can be corrected by rotating the ENG FEED knob to the FWD or AFT position until the imbalance is corrected. Refer to FUEL IMBALANCE, Section III. Erroneous fuel indications may occur during or immediately after maneuvering flight.

Fuel Control Panel (Typical)



1. FUEL MASTER Switch
2. TANK INERTING Switch
3. ENG FEED Knob
4. AIR REFUEL Switch

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Figure 1-9.

FUEL CONTROL PANEL CONTROLS (Refer to figure 1-9)

CONTROL	POSITION	FUNCTION
1. FUEL MASTER Switch	MASTER (guarded)	Opens engine fuel shutoff valve which then opens the EEC fuel shutoff valve
	OFF	Closes engine fuel shutoff valve which then closes the EEC fuel shutoff valve
2. TANK INERTING Switch	TANK INERTING	Opens valve at Halon reservoir. Opens initial inerting valve for 20 seconds
		Reduces tank pressurization. Allows small continuous flow of Halon into tank

FUEL CONTROL PANEL CONTROLS - Continued

CONTROL	POSITION	FUNCTION
2. TANK INERTING Switch - continued	OFF	Closes valve at Halon reservoir. Returns fuel tank pressurization to normal schedule
3. ENG FEED Knob	NORM	Energizes all pumps. CG maintained automatically
	AFT	Energizes pumps in aft tanks and opens crossfeed valve. Fuel is transferred from aft tanks to the engine and forward tanks. CG moves forward
	FWD	Energizes pumps in forward tanks and opens crossfeed valve. Fuel is transferred from forward tanks to the engine and aft tanks. CG moves aft
	OFF	Deenergizes all electric-driven pumps. Engine supplied by FFP
4. AIR REFUEL Switch	OPEN	Opens slipway door. Places FLCS in takeoff and landing gains
		Enables slipway light. Turns on AR floodlight and Block 15 vertical tail-mounted floodlight
		Reduces internal tank pressurization, depressurizes external tanks, and allows the refuel valve in each reservoir to open when a centerline tank is installed and refuel pressure is applied
	CLOSE	Reverses the OPEN actions

Fuel Quantity Indicator and Select Panel (Typical)

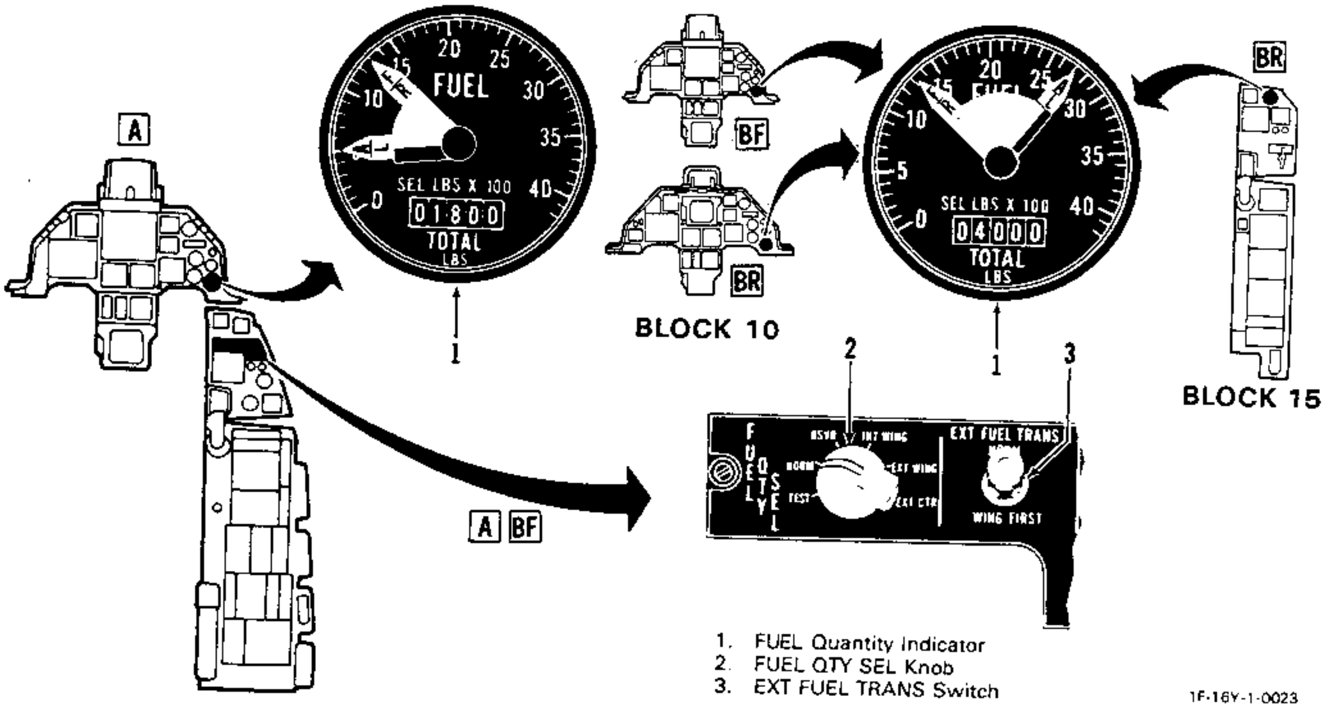


Figure 1-10.

FUEL QUANTITY INDICATOR AND SELECT PANEL CONTROLS AND INDICATORS
(Refer to figure 1-10)

CONTROL/INDICATOR	POSITION	FUNCTION
1. FUEL Quantity Indicator	AL and FR pointers	Display fuel quantities as determined by the FUEL QTY SEL knob
	Totalizer	Displays total fuel in all fuel tanks (fuselage + wing + external)
	RED portion of AL pointer showing	Indicates fuel imbalance between forward and aft fuselage tanks
2. FUEL QTY SEL Knob	TEST	AL/FR pointers drive to 2000 (± 100) pounds
		Totalizer drives to 6000 (± 100) pounds
		Both fuel low caution lights illuminate and remain illuminated 76 for approximately 60 seconds after (**LESS** 76 until) the knob is moved out of TEST

FUEL QUANTITY INDICATOR AND SELECT PANEL CONTROLS AND INDICATORS – Continued

CONTROL/INDICATOR	POSITION	FUNCTION
2. FUEL QTY SEL Knob – continued	NORM	AL pointer displays sum of fuel in aft reservoir and aft fuselage tanks (A-1)
		FR pointer displays sum of fuel in forward reservoir and forward fuselage tanks (F-1, F-2)
		Enables automatic forward fuel transfer system
	RSVR	AL/FR pointers display fuel in aft/forward reservoir tanks
	INT WING	AL/FR pointers display fuel in left/right wing tank
	EXT WING	AL/FR pointers display fuel in left/right external wing tanks
	EXT CTR	AL pointer drops to zero
		FR pointer displays fuel in centerline tank
3. EXT FUEL TRANS Switch	NORM	Centerline tank transfers first and then external wing tank
	WING FIRST	External wing tanks transfer first and then centerline tank

FUEL LOW Caution Lights

The fuel low lights (figure FO-15) indicate low fuel quantity in the reservoir tanks. These lights are independent of the fuel quantity indicating system. The FWD FUEL LOW light illuminates when fuel quantity in the forward reservoir drops below 400 (B 250) pounds. The AFT FUEL LOW light illuminates when aft reservoir fuel quantity drops below 250 (B 400) pounds. The fuel low lights are powered by the essential dc bus No. 2.

HUD FUEL Low/Bingo Indication

In addition to the fuel low caution lights, a fuel low condition may be indicated by the word FUEL in the HUD in conjunction with the home mode of the FCC or the previously entered bingo fuel value.

For a more detailed description of the home mode and the bingo fuel option, refer to T.O. 1F-16A-34-1-1.

FUEL HOT Caution Light

When the temperature of fuel to the engine becomes excessive, main fuel pump cavitation may occur and the FUEL HOT caution light (figure FO-15) will illuminate.

FUEL TANK EXPLOSION SUPPRESSION SYSTEM

The fuel tank explosion suppression system inerts the fuel vapors inside the tanks and is intended for use only in combat and during emergencies. The system is controlled by the fuel tank inerting switch on the fuel control panel. The system uses Halon as an inerting agent which prevents combustion when mixed with air. For the agent specification and tank location, refer to the servicing diagram, figure 1-67. The Halon reservoir has a heater, controlled by a thermostatic switch, which assures sufficient operating pressure. The RMLG WOW switch prevents operation of the heater while the aircraft is on the ground.

When the system is activated, a valve at the Halon reservoir is opened and the fuel tank vent and pressurization system is placed on a reduced pressure schedule. At each actuation of the TANK INERTING switch, Halon is metered into the F-1, A-1, and internal wing tanks for 20 seconds for initial inerting.

Thereafter, a continuous small flow of Halon is mixed with the pressurization air to maintain the inert condition. The small flow continues until the system is turned off or until the MAIN PWR switch is positioned to OFF.

Because of limited Halon supply, the system should be actuated just prior to entering a combat zone, but before half of the internal fuel is depleted. Do not cycle the TANK INERTING switch. The fuel tank explosion suppression system does not protect the external fuel tanks.

REFUELING SYSTEM

Ground Refueling

All external and internal fuel tanks can be pressure filled from a single-point refueling receptacle located on the lower left side of the fuselage just forward of the wing trailing edge. Electrical power is not required to refuel the aircraft unless fuel quantity is to be monitored. Terminating refueling with partially filled tanks could result in fuel imbalance. When a partial fuel load is required, fuel distribution should be corrected prior to flight by selective operation of the fuel transfer pumps controlled by the ENG FEED knob.

Air Refueling (AR) System

The AR system consists of a hydraulically actuated receptacle and slipway door, a signal amplifier, and the associated controls and indicators. Hydraulic system B provides pressure for operation of the door and latch mechanism. The receptacle is located on the top fuselage centerline aft of the canopy. When the slipway door is opened, a mechanical linkage retracts the aft end of the slipway door into the fuselage, forming a slipway into the receptacle. When the AIR REFUEL switch is placed to the OPEN position, the external tanks are depressurized, external fuel will not transfer, and the FLCS is placed in takeoff and landing gains.

When closed, the slipway door is flush with the fuselage skin. The AR receptacle is equipped with four lights, two located on each side. An AR floodlight is located on the top fuselage centerline immediately aft of the canopy. Block 15 A light on the upper leading edge of the vertical tail floods the AR receptacle area and the upper fuselage.

During AR operations, the AR boom enters the receptacle and is automatically latched in place by a hydraulic actuating mechanism. The HOT MIC switch allows interphone communications with compatible tankers through the AR boom. When the last refuel shutoff valve closes, a pressure switch automatically provides a signal to unlatch the boom from the receptacle. A disconnect signal can be manually initiated at anytime during AR by the receiver or by the tanker boom operator.

Fuel venting can occur during AR, particularly when the aircraft is configured with external tanks. After the AR slipway door is closed, confirm fuel quantity at the completion of AR. Terminating the AR operation in a partially filled condition could result in fuel imbalance. When a partial fuel load is required, fuel distribution should be monitored and corrected as required by use of the ENG FEED knob.

NOSEWHEEL STEERING/AIR REFUEL DISCONNECT/MISSILE STEP BUTTON

The pushbutton switch (figure 1-26), located on the stick, is labeled NWS, A/R DISC, and MSL STEP. The AR function of the switch is activated when the aircraft is airborne and the AIR REFUEL switch is positioned to OPEN. The button provides a means of manually disconnecting the AR boom. Depressing the switch causes the boom latching mechanism to unlatch and release the boom.

AIR REFUELING (AR) STATUS INDICATOR

The AR status indicator (figure FO-15), located to the right of the HUD, contains three lights.

Functions are:

- RDY – Illuminates blue when the AR slipway door is open and the system is ready.
- AR/NWS – Illuminates green when the boom is latched in place.
- DISC – Illuminates amber when a disconnect occurs. After the disconnect, the system will automatically recycle to ready, and the RDY light will illuminate after a 3-second delay.

A lever for dimming the three lights is located on the right side of the unit.

ENVIRONMENTAL CONTROL SYSTEM (ECS)

The ECS (figure 1-11) combines air-conditioning and pressurization functions to provide temperature-controlled, pressure-regulated air for heating, cooling, ventilating, canopy defogging, cockpit pressurization, canopy sealing, anti-g suit pressurization,

fuel tank pressurization, and electronic equipment cooling. Most of these functions are lost when the AIR SOURCE knob is placed to OFF or RAM. Refer to AIR SOURCE KNOB, this section.

AIR-CONDITIONING

High-pressure hot bleed air from the 7th- or 13th-stage is directed through a turbine compressor and air-to-air heat exchangers where it is cooled by ram air. The conditioned air is then used for the functions shown in figure 1-11.

A cockpit temperature controller receives signals from temperature sensors and from a manually operated control panel to automatically control the cockpit temperature. Conditioned air enters the cockpit on both sides, the top rear of the seat, through the angle vent on the instrument panel, and through the canopy defogger. In the event of an ECS malfunction, emergency ram air operation can be selected for ventilation and cooling.

A ground cooling cart can be connected on the lower left side of the fuselage just above the nosewheel area to provide cooling air to the cockpit and avionic equipment.

PRESSURIZATION

Air pressure is provided by the pressurization system for control/operation of some of the ECS, canopy seal, anti-g suit, fuel tanks, and radar. Pressure in the cockpit is controlled automatically according to the schedule shown in figure 1-12. A cockpit pressure safety valve relieves pressure anytime the cockpit pressure exceeds ambient pressure by 5.4 psi.

The canopy seal is inflated/deflated with the mechanical locking/unlocking of the canopy.

AIR SOURCE Knob A BF

The AIR SOURCE knob (figure 1-13) is located on the ECS panel.

Functions are:

- OFF – Engine bleed air valves close. All air-conditioning, cooling, and pressurizing functions shut off, including anti-g suit, canopy seal, and fuel tank pressurization.
- NORM – Air-conditioning system set for automatic temperature and pressure regulation.
- DUMP – Cockpit pressure dump valve opens to atmospheric pressure. Conditioned air ventilates cockpit and performs all other system functions.
- RAM – Engine bleed air valves close. All air-conditioning cooling and pressurizing functions shut off including anti-g suit, canopy seal, and fuel tank pressurization. The ram air valve opens to admit ram air to ventilate the cockpit and avionic equipment.

Temperature Knob A BF

The temperature knob (figure 1-13) is located on the ECS panel and only controls cockpit temperature.

Functions are:

- AUTO – Cockpit temperature is automatically maintained (60°-80°F) relative to the setting of the knob.
- MAN – The temperature control drives the air modulating valve to a set position. Cockpit temperature will vary according to throttle setting, OAT, and cockpit heat load. If WARM is selected, the cockpit supply air temperature may exceed the maximum allowable limit of approximately 177°F. This causes the warm air valve to cycle on and off. This is a normal occurrence and can be stopped by selecting a cooler setting.
- TEMP OFF – Hot air mixing is shut off. Only air at approximately 35°F is delivered to cockpit.

Under extreme temperature conditions, system performance on the ground can be improved by advancing the throttle 1-3 percent above idle rpm. Operation with the radar in OFF will improve cockpit cooling and operation with the radar in STBY will improve cockpit heating.

DEFOG Lever A BF

The DEFOG lever (figure 1-14) is located on the far aft portion of the left console. The lever mechanically controls a flapper valve in the cockpit air supply line.

Environmental Control System (Typical)

BLOCK 10

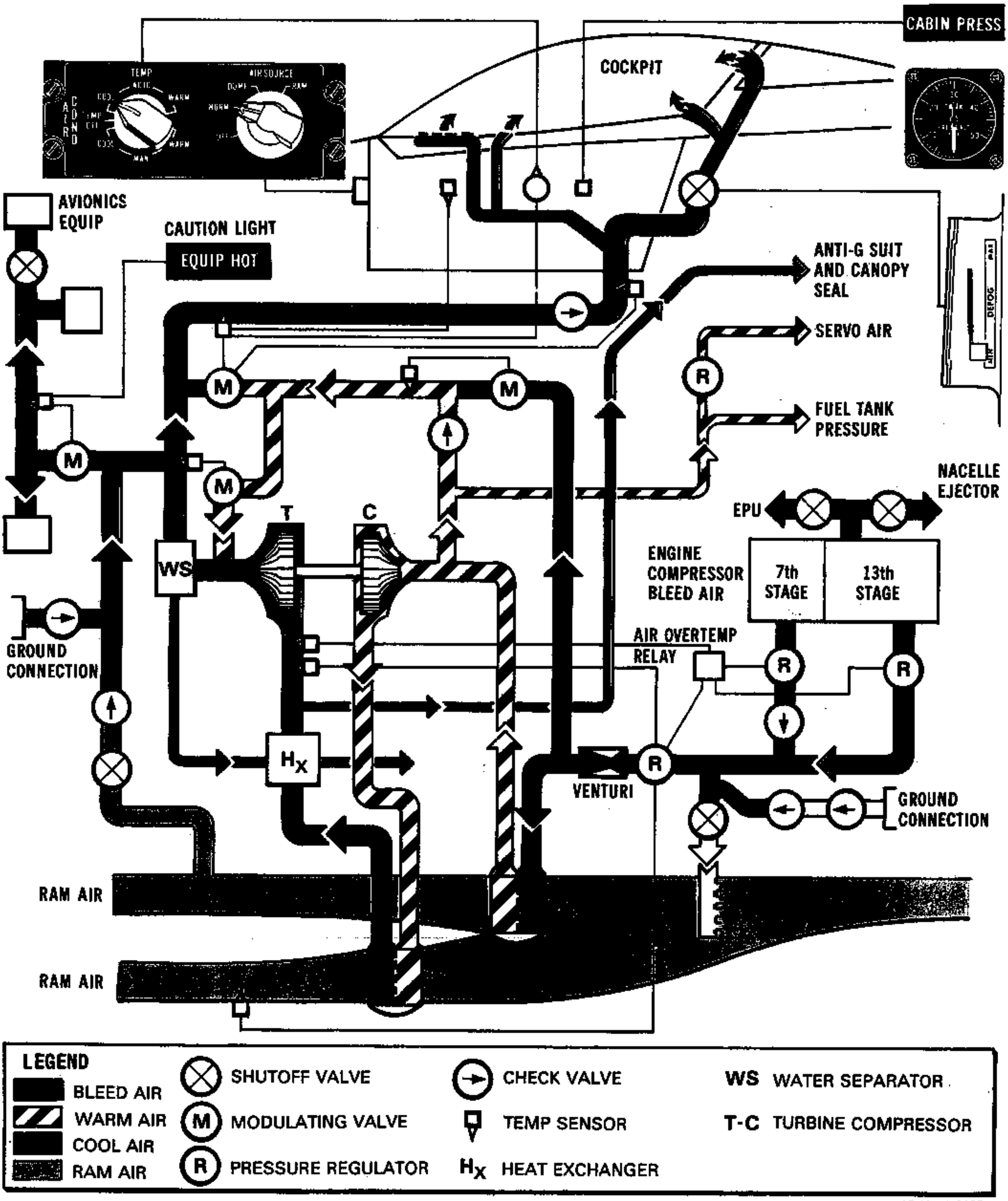


Figure 1-11. (Sheet 1)

Environmental Control System (Typical)

BLOCK 15

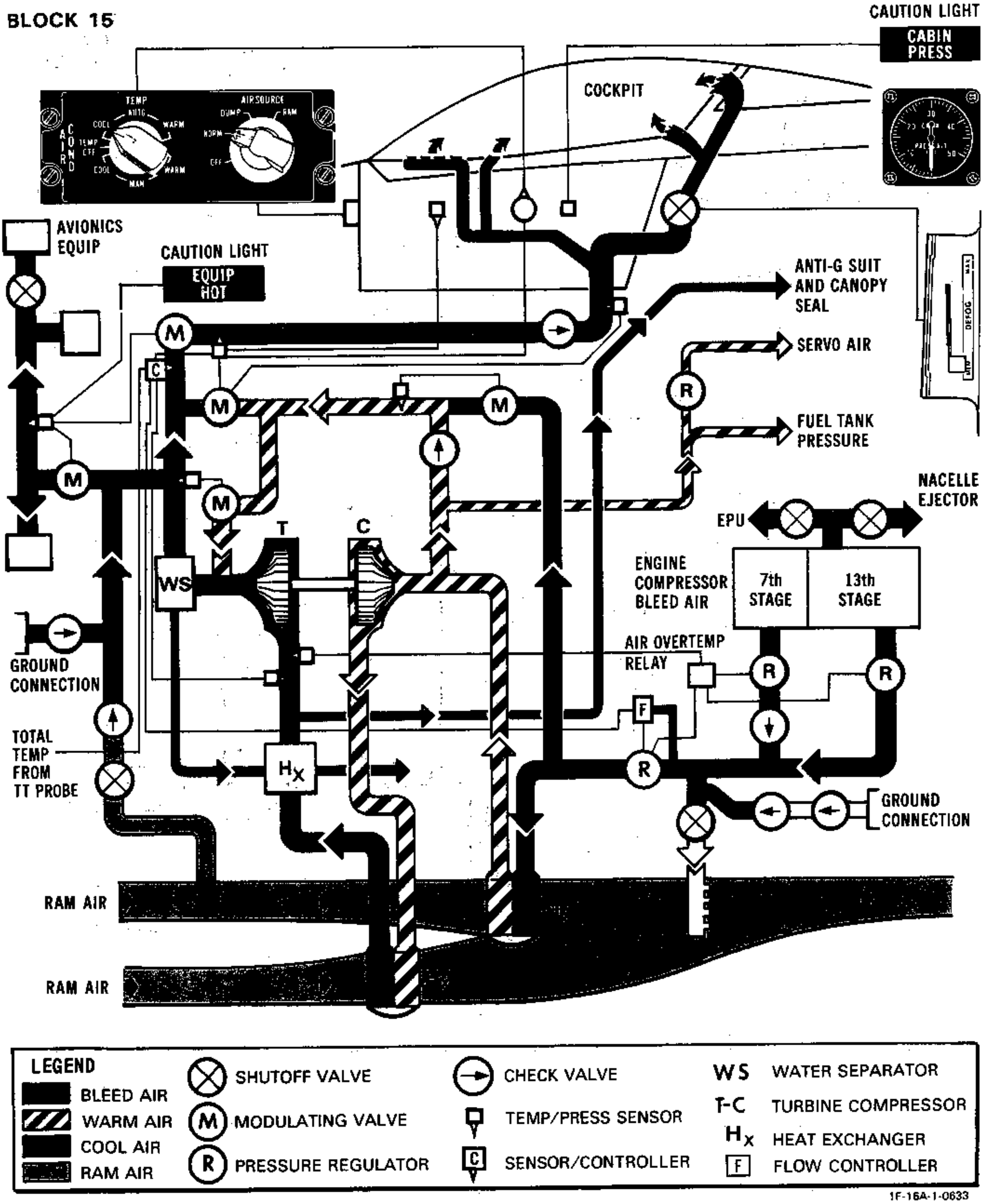


Figure 1-11. (Sheet 2)

Cockpit Pressure Schedule

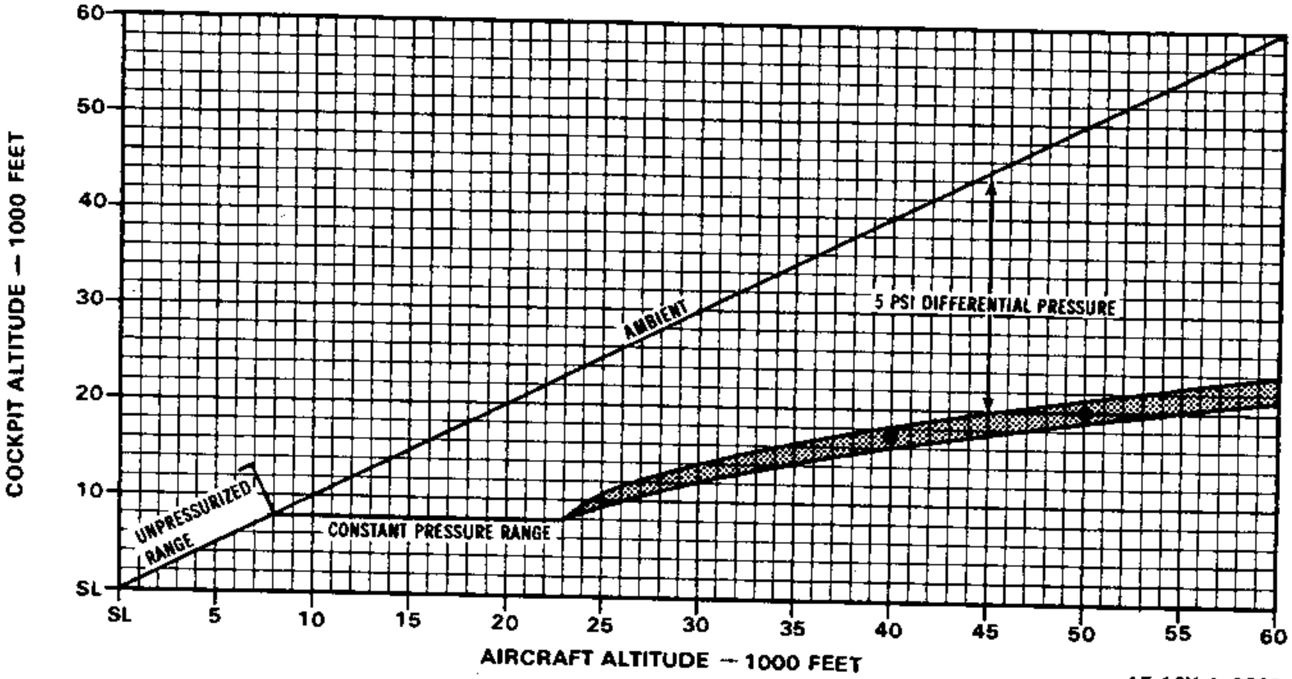
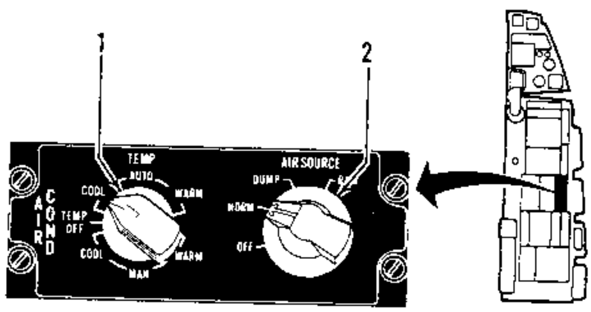


Figure 1-12.

Environmental Control System Control Panel A BF (Typical)



1. TEMP Knob
2. AIR SOURCE Knob

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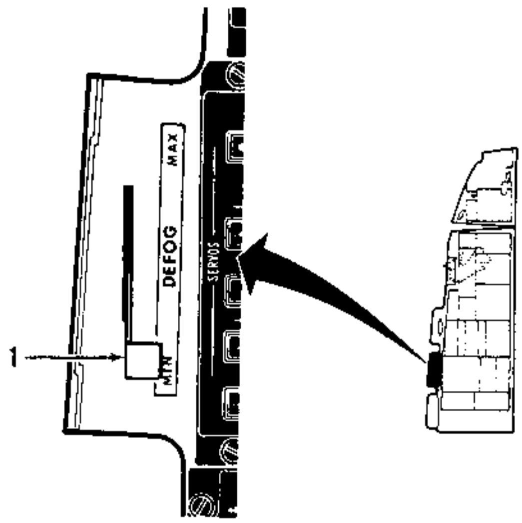
Figure 1-13.

Defog Control A BF (Typical)



1. DEFOG Lever

1F-16A-1-0027

Figure 1-14.

Functions are:

- MIN – Minimum airflow toward the canopy forward area and air vent in center pedestal; maximum airflow to outlets behind seat.
- MAX – Most of the cockpit air supply is diverted to the canopy forward area for defogging and to the air vent in the center pedestal. The vent can be manually closed to further enhance the defogging action. When placed in the full forward defog position and with the temperature knob in AUTO, the lever activates a switch which shifts the cockpit air supply control to full warm. The full warm air supply automatically terminates 3 minutes after activation. The lever may be cycled to restart the full warm, 3-minute period.

Under extremely humid conditions or after initial engine start, fog may form at the cockpit air outlets as the cold air mixes with the moist cockpit atmosphere. This condition can be eliminated by selecting MAN and moving toward WARM until the fog stops forming. In flight, while operating in AUTO, the most rapid method of eliminating air outlet fogging is by selecting the MAX position on the DEFOG lever. Fog may form on the interior surface of the canopy as a result of moisture in the cockpit air condensing on the cold surface. To warm the canopy surface above the dewpoint and permit the cockpit air to retain more moisture during cold weather operation, the DEFOG lever should be placed in a forward position and the TEMP control positioned to MAN WARM.

EQUIP HOT Caution Light

The EQUIP HOT caution light (figure FO-15) is located on the caution light panel on the right console. The caution light illuminates when the avionic equipment cooling air temperature/pressure is insufficient.

Degraded equipment performance and/or damage can result from overheating. Therefore, when the EQUIP HOT caution light illuminates, the electronic equipment should be turned off unless it is essential for flight. Illumination of the EQUIP HOT caution light automatically interrupts electrical power to the radar. Turning the radar to OFF in flight does not close the radar cooling air shutoff valve. **LESS** 46 Positioning the DEFOG lever more forward will increase airflow to the avionics.

A short duration or intermittent EQUIP HOT caution light may occur when ground cooling air is disconnected.

Cockpit Pressure Altimeter A BF

The cockpit pressure altimeter (figure FO-3) is located on the right auxiliary console outboard of the stick and is labeled CABIN PRESS ALT.

CABIN PRESS Caution Light

The CABIN PRESS caution light (figure FO-15) is located on the caution light panel. The caution light illuminates when the cockpit pressure altitude is above 27,000 feet.

ANTI-G SYSTEM

The anti-g suit connector and test button are located on the anti-g panel at the aft end of the left console (figure FO-3). The ECS delivers cooled bleed air to the anti-g suit. Airflow is proportional to the positive g forces sensed. If an ECS shutdown occurs, anti-g suit protection is not available.

The system can be manually tested by depressing the anti-g TEST button to inflate the suit. The system incorporates an automatic pressure relief valve.

PRESSURE SUIT PROVISION

A pressure suit switch (figure FO-3) is located on the outboard edge of the right console. The switch is nonfunctional.

ELECTRICAL SYSTEM

The electrical system (figure FO-7) consists of an ac power system, an emergency ac power system, a dc power system, an FLCS power supply, and provisions for an external ac power source. Refer to figures 1-16 and 1-17 for electrical power distribution.

AC POWER SYSTEM

Electrical power is normally supplied by a 40 kva main generator located on the ADG (figure 1-3). The main generator supplies power to the nonessential and essential ac buses. The essential ac buses power dc buses through ac to dc converters. The main generator contains a permanent magnet generator

(PMG) which provides one source of dc start power for the emergency power unit (EPU) if the main generator fails but is still rotating.

EMERGENCY AC POWER SYSTEM

If the main generator fails, emergency ac power is supplied automatically by a 5 kva generator (EPU generator) driven by the EPU. The system supplies power to the essential ac and dc buses. The EPU generator has a PMG which supplies dc power through an ac to dc converter to the four FLCS branches. Refer to EMERGENCY POWER UNIT, this section, for further discussion of the EPU.

DC POWER SYSTEM

DC power is supplied by two dc essential buses. With the main generator operating, one of these buses also powers the dc nonessential bus. An aircraft battery powers the battery bus and provides one source of start power for the EPU. When the essential dc buses are on the line, they power the battery bus; then the aircraft battery is disconnected and charged by a battery charger which receives power from the essential dc bus No. 1. If the main and EPU generators have failed, none of the dc buses is powered and the aircraft battery supplies power to the battery bus which is available to the FLCS power supply (if needed).

FLCS POWER SUPPLY 66

The primary FLCS power supply (figure FO-7) includes a dedicated FLCS PMG (figure 1-3), two dual-channel converter/regulators, and four inverters.

Available FLCS power sources are the FLCS PMG, the main generator, the EPU generator, the EPU PMG, the aircraft battery, and the FLCS batteries.

The FLCS PMG is the primary power source for the FLCS during normal operations. The FLCS PMG is located on the ADG and generates power whenever the ADG is rotating. The PMG has four outputs, one for each branch of the FLCS, and generates sufficient power to operate the FLCS at 40 percent rpm or greater.

Two converter/regulators, having two channels each, provide a separate channel for each inverter. The converter/regulators normally receive power from the FLCS PMG, dc essential bus No. 1, and the battery bus. If the EPU is running, the EPU PMG also provides power to the converter/regulators. Each converter/regulator channel selects the power source with the highest voltage (within limits), converts ac power from the FLCS PMG to dc, and provides dc power to the respective inverter. Converter/regulator output voltages are regulated to prevent overvoltage to the FLCS inverters.

Each inverter then changes dc to ac power for the FLCS. If the converter/regulator output voltage is less than the FLCS battery voltage, the FLCS battery will power the FLCS branch until balance is reached or the battery is depleted. The converter/regulators also provide fault indications for display on the electrical control panel and provide test indications to the test switch panel.

The primary function of the FLCS batteries is to provide temporary emergency power to the FLCS; the batteries are not intended to be a continuous emergency power source. The FLCS batteries are continually charged by power from the converter/regulators when the MAIN PWR switch is in BATT or MAIN PWR. When the MAIN PWR switch is OFF, a trickle charge circuit maintains the FLCS battery charge with power from the aircraft battery.

FLCS POWER SUPPLY LESS 66

The FLCS power supply (figure FO-7) includes four inverters, one for each branch. The inverters change dc power to ac power for the FLCS.

The inverters can use power from the aircraft main generator, the EPU generator, the EPU PMG, the aircraft battery, or the FLCS batteries.

Each inverter normally receives power from dc essential bus No. 1 and from the battery bus. If the dc essential buses are not powered but the EPU PMG is still rotating at proper speed, the PMG can power the FLCS inverters. If the PMG is inoperative, the aircraft battery and/or the four FLCS batteries will continue to power the FLCS until depleted. The EPU PMG power source to the FLCS inverters can temporarily charge the FLCS batteries to a higher than normal voltage level during EPU operation. Following EPU termination or failure after prolonged operation, the FCS DISC light may illuminate steadily.

The primary function of the FLCS batteries is to maintain power to the FLCS inverters during power switching transients. They are not intended to be an

emergency power source. The FLCS batteries are continuously charged by the dc essential buses and by the aircraft battery when the dc buses are not powered.

EXTERNAL POWER SYSTEM

The external power system includes a standard external power cable receptacle and a monitor unit. The monitor unit allows external power to be connected to the aircraft buses if the phasing, voltage, and frequency of the external power are correct. When connected, the external power provides the same power as the main generator.

OVERLOAD PROTECTION UNITS

The overload protection units operate similarly to a conventional circuit breaker to protect a circuit from overloads. The units protect various electrical buses and store stations. The ELEC CAUTION RESET button on the electrical control panel may reset an ac bus protection unit that has tripped.

46 The aircraft has eight overload protection units and **LESS** 46 aircraft has six.

ELECTRICAL SYSTEM CONTROLS AND INDICATORS (Refer to figure 1-15)

NORMAL OPERATION 66

Prior to engine start, the MAIN PWR switch is placed to BATT to permit a check of the aircraft and FLCS batteries. The ELEC SYS, FLCS PMG, and MAIN GEN lights come on. In addition, the ACFT BATT TO FLCS light comes on to indicate that the aircraft battery is powering the FLCS, and the FLCS PWR lights come on to indicate that the FLCS inverter outputs are good. With the FLCS PWR TEST switch held in TEST, the ACFT BATT TO FLCS light will go off (FLCS PMG light will also go off). The FLCS BATT lights come on and the FLCS PWR lights remain on to indicate that the FLCS batteries are good.

With the FLCS PWR TEST switch in NORM, when the MAIN PWR switch is moved to MAIN PWR for start on battery power, the lights do not change. If external power is used, the MAIN GEN, ACFT BATT TO FLCS, and the FLCS PWR lights will go off when the MAIN PWR switch is moved to MAIN PWR.

During engine start, the FLCS PMG light will go off at approximately 40 percent rpm, and all other electrical system lights will go off as the main generator comes on the line at approximately 45 percent rpm. External power, if used, will be removed from the aircraft buses when the main generator comes on the line.

Anytime after selecting MAIN PWR, including in flight, the FLCS PWR TEST switch may be held momentarily in TEST to check inverter output. During the EPU test, the FLCS PWR lights will come on to indicate that EPU PMG power is available to the FLCS.

During engine shutdown, the ELEC SYS caution light and FLCS PMG and MAIN GEN lights will come on as the engine spools down. The ACFT BATT TO FLCS light may also illuminate.

NORMAL OPERATION LESS 66

Prior to engine start without external power, the ELEC SYS caution and GEN MAIN lights will be illuminated when the MAIN PWR switch is positioned to MAIN PWR, indicating ac power is not available. The lights will go off when the main generator comes on the line as the engine accelerates through approximately 45 percent.

If an external power cable is connected but external power is not present, the MAIN PWR switch should be in OFF to avoid tripping an electrical system circuit breaker. Move the MAIN PWR switch to MAIN PWR only when external power is available.

During engine start, external power is removed from the aircraft buses when the main generator comes on the line.

During engine shutdown, the main generator drops off the line at approximately 35 percent. The GEN MAIN and ELEC SYS lights will illuminate. The FCS DISC light may illuminate depending on FLCS batteries state of charge.

Electrical System Controls and Indicators A BF 66 (Typical)

1. MAIN PWR Switch
2. FLCS PMG Indicator Light
3. MAIN GEN Indicator Light
4. STBY GEN Indicator Light
5. EPU GEN Indicator Light
6. EPU PMG Indicator Light
7. FLCS BATT Indicator Lights
8. ACFT BATT Indicator Lights
9. ELEC SYS Caution Light
10. ELEC CAUTION RESET Button
11. FLCS PWR TEST Switch
12. FLCS PWR Indicator Lights

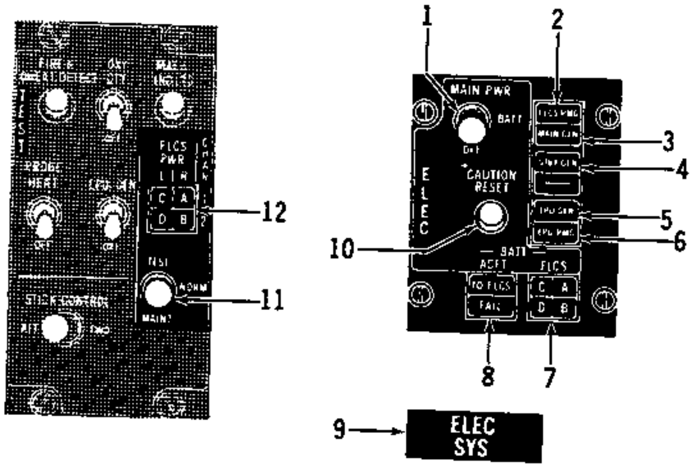


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Figure 1-15. (Sheet 1)

ELECTRICAL SYSTEM CONTROLS AND INDICATORS 66 (Refer to figure 1-15, sheet 1)

CONTROL/INDICATOR	POSITION/INDICATION	FUNCTION
1. MAIN PWR Switch	MAIN PWR	Connects external power or the main generator to the electrical system and determines function of FLCS PWR TEST switch. If ac power is not available, connects aircraft battery to the battery bus
	BATT	Connects aircraft battery to the battery bus, disconnects main generator or external power, determines function of FLCS PWR TEST switch, and is used to reset the main generator
	OFF	In flight – inoperative
		On ground – disconnects all power from aircraft electrical system. Canopy operation and FLCS battery trickle charge are available

ELECTRICAL SYSTEM CONTROLS AND INDICATORS 66 (Refer to figure 1-15, sheet 1) – Continued

CONTROL/INDICATOR	POSITION/INDICATION	FUNCTION
2. FLCS PMG Indicator Light	FLCS PMG	In flight – FLCS PMG is not supplying power to any FLCS branch
		On ground – FLCS PMG power is not available at one or more FLCS branches. Light is delayed 60 seconds after initial NLG WOW
3. MAIN GEN Indicator Light	MAIN GEN	Indicates external power or main generator not connected to the bus system
4. STBY GEN Indicator Light	STBY GEN	Not operational
5. EPU GEN Indicator Light	EPU GEN	Indicates the EPU has been commanded on but the EPU generator is not providing power to both essential ac buses. The light will not function with the EPU switch in OFF (WOW) and the engine running
6. EPU PMG Indicator Light	EPU PMG	Indicates the EPU has been commanded on but EPU PMG power is not available to all branches of the FLCS
7. FLCS BATT Indicator Lights	A, B, C, and D	Indicate the respective FLCS battery discharging to the indicated FLCS branch
8. ACFT BATT Indicator Lights	TO FLCS	In flight – indicates battery bus is supplying power to one or more FLCS branches and voltage is 25V or less
		On ground – indicates battery bus is supplying power to one or more FLCS branches
	FAIL	In flight – indicates aircraft battery failure (20V or less)
		On ground – indicates aircraft battery failure, cell voltage imbalance, or overheat condition. Light is delayed 60 seconds after MLG WOW

ELECTRICAL SYSTEM CONTROLS AND INDICATORS 66 (Refer to figure 1-15, sheet 1) – Continued

<table>
<tr><th>CONTROL/INDICATOR</th><th>POSITION/INDICATION</th><th colspan="2">FUNCTION</th></tr>
<tr><td>9. ELEC SYS Caution Light</td><td>ELEC SYS</td><td colspan="2">Illuminates in conjunction with any of the above lights. Also illuminates if one or more FLCS batteries are not connected when the main generator is on line</td></tr>
<tr><td>10. ELEC CAUTION RESET Button</td><td>Push</td><td colspan="2">Resets ELEC SYS caution light and clears MASTER CAUTION light for future indications. Resets overload protection unit for the nonessential ac bus and 46 the nacelle ac bus</td></tr>
<tr><td rowspan="6">11. FLCS PWR TEST Switch</td><td rowspan="3">TEST</td><td colspan="2">When MAIN PWR switch is in:</td></tr>
<tr><td>MAIN PWR</td><td>BATT</td></tr>
<tr><td>Tests FLCS inverter output</td><td>Tests FLCS batteries on ground</td></tr>
<tr><td>NORM</td><td>Normal position. Tests EPU PMG power availability during EPU/GEN test on ground</td><td>Tests FLCS power on aircraft battery</td></tr>
<tr><td>MAINT</td><td colspan="2">For maintenance use on the ground. Inoperative in flight</td></tr>
<tr><td>12. FLCS PWR Indicator Lights</td><td>A, B, C, and D</td><td colspan="2">Illuminate to indicate proper FLCS inverter output during FLCS power tests</td></tr>
</table>

Electrical System Controls and Indicators A BF LESS 66 *(Typical)*

1. MAIN PWR Switch
2. GEN Indicator Lights
3. BATT Indicator Lights
4. ELEC SYS Caution Light
5. ELEC CAUTION RESET Button

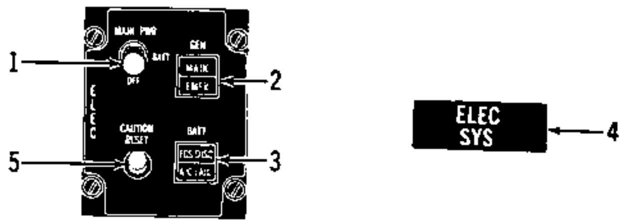

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Figure 1-15. (Sheet 2)

ELECTRICAL SYSTEM CONTROLS AND INDICATORS **LESS** 66 (Refer to figure 1-15, sheet 2)

CONTROL/INDICATOR	POSITION/INDICATION	FUNCTION
1. MAIN PWR Switch	MAIN PWR	Connects external power or the main generator to the electrical system. If ac power is not available, connects aircraft battery to the battery bus
	BATT	Connects aircraft battery to the battery bus, disconnects main generator or external power, and is used to reset the main generator
	OFF	In flight – inoperative
		On ground – disconnects all power from aircraft electrical system. Canopy operation and FLCS battery trickle charge are available

ELECTRICAL SYSTEM CONTROLS AND INDICATORS **LESS** 56 (Refer to figure 1-15, sheet 2)–
Continued

CONTROL/INDICATOR	POSITION/INDICATION	FUNCTION
2. GEN Indicator Lights	MAIN	Indicates external power or main generator not connected to the bus system
	EMER	Indicates the EPU has been commanded on but is not providing power to both essential ac buses. The light will not function with the EPU switch in OFF (WOW) and the engine running
3. BATT Indicator Lights	FCS DISC	Indicates one or more of the four FLCS batteries are supplying power to the FLCS inverters
	A/C FAIL	Indicates malfunction in the aircraft battery system
4. ELEC SYS Caution Light	ELEC SYS	Illuminates in conjunction with any of the above lights except the GEN EMER light
5. ELEC CAUTION RESET Button	Push	Resets ELEC SYS caution light and clears MASTER CAUTION light for future indications. Reconnects FLCS battery(ies) to inverters. Resets overload protection unit for the nonessential ac bus and 46 the nacelle ac nonessential bus

AC Power Distribution

BLOCK 10

ESSENTIAL AC BUS NO. 1

Air Data Probe Heaters (Nose & Fuselage)
Altimeter (ELECT)
AOA Indicator
AOA Probe Heaters
CADC
DC Converter
ECA
Fuel Flow Indicator
HUD/CTVS
INS
LEF's
Primary Console Lights
Primary Instrument Lights
Nav/Freq Display

ESSENTIAL AC BUS NO. 2

ADI
AIM-9 Audio & Gyro
Anticollision Light
AR Light (flood)
DC Converter
Engine Ice Detector
Fire/Overheat Detect & Test
Fuel Quantity Indicator
Gun
HSI
Hyd Pressure Indicators
Landing Light
Nozzle Position Indicator
Oil Pressure Indicator
Oxygen Quantity Indicator
Position Lights
TACAN

NONESSENTIAL AC BUS NO. 1

FCC
FCR
INS Heater
Interference Blanker
REO
TT Probe Heater

NONESSENTIAL AC BUS NO. 2

Aircraft Battery Heater
Flight Loads Recorder
Flood Console Lights
Flood Instrument Lights
Formation Lights
Fuel Boost & Transfer Pumps
Halon Heater
IFF (mode 4)
Inlet Strut Heater
Seat Adjust
Stores Normal Armed Release (AGM-65A, B)
Taxi Light
TISL
TWS

NOTE

Nonessential buses are not powered by EPU generator

Figure 1-16. (Sheet 1)

AC Power Distribution

BLOCK 15

ESSENTIAL AC BUS NO. 1

Air Data Probe Heaters
(Nose & Fuselage)
Altimeter (ELECT)
AOA Indicator
AOA Probe Heaters
CADC
DC Converter
ECA
Primary Console Lights
Primary Instrument Lights
Fuel Flow Indicator
HUD/CTVS
INS
LEF's
Nav/Freq Display

ESSENTIAL AC BUS NO. 2

ADI
AIM-9 Audio & Gyro
Anticollision Light
AR Light (flood)
Data Transfer Unit
DC Converter
Engine Ice Detector
Fire/Overheat Detect
& Test
Fuel Quantity Indicator
Gun
HSI
Hyd Pressure Indicators
Landing Light
Nozzle Position Indicator
Oil Pressure Indicator
Oxygen Quantity Indicator
Position Lights
TACAN

NACELLE AC BUS

Missile Electronics
Stations 1, 2, 3A, 7A, 8, 9

NONESSENTIAL AC BUS NO. 1

FCC
FCR
INS Heater
Interference Blanker
REO
TT Probe Heater

NONESSENTIAL AC BUS NO. 2

Aircraft Battery Heater
Data Control
Flight Loads Recorder
Flood Console Lights
Flood Instrument Lights
Formation Lights
Fuel Boost & Transfer Pumps
Halon Heater
IFF (Mode 4)
Inlet Strut Heater
Seat Adjustment
Stores Normal Armed Release
(AGM-65A, B)
Taxi Light
TISL
TWS

NOTE

Nonessential buses are not powered by EPU generator

Figure 1-16. (Sheet 2)

DC Power Distribution

BLOCK 10

ESSENTIAL DC BUS NO. 1

A BF ALT REL Button
AOA Indexer
AR System
Autopilot
Battery Bus Feeder
Battery Charge Power
CADC Caution Light
CIU
Cockpit Temp Control
Data Control
EEC Caution Light (EEC faults)
ENGINE ANTI-ICE Switch
Envir Control Test
FCNP
FLCP (all lights reset/arm and self-test capability)
FLCS Power Source
Instrument Mode Select
LEF Motor (1)
LG Down Permission Button
LG Wheels Down Lights
Master Arm Switch
Missile Step Switch
MLG WOW
NUCLEAR CONSENT Switch
NWS
Probe Heat Switch
SCP (left half)
Speedbrakes
Stations 1, 4, 5, 7 & 8 Normal Armed Release
Stores Jettison (SEL & EMER)
TACAN
VHF Radio
BR WPN REL Button

ESSENTIAL DC BUS NO. 2

Auto Fwd Fuel Trans
Autopilot
AVTR
Battery Bus Feeder
LESS 48 Brake Hydraulic Circuit (1) (half brakes)
Camera/Gun Trigger
CIU
ECA
ECS
EQUIP HOT Caution Light
External Fuel Transfer
FUEL LOW Caution Lights
Gun
HUD
ILS
Landing/Taxi/ External/ DE NO A ID Light Switches
LEF Motor (1)
LEF & ADC Caution Lights
LG Door Close
LG Hyd Isolation
LG Up-Dn Command
Master Arm Switch
OXY LOW Caution Light
SCP (right half)
SEAT NOT ARMED Caution Light
Secure Voice
Stations 2, 3, 6 & 9 Normal Armed Release
Stick Trim
STORES CONFIG Caution Light
Stores Jettison (SEL and EMER)
TWS
A BF WPN REL button

NONESSENTIAL DC BUS NO. 1

Chaff Dispenser
ECM
ENG FEED Knob
FCR
Flight Loads Recorder
FUEL HOT Caution Light
IFF
Mal & Ind Light Test/Dim Feature
MAX POWER Switch
Nacelle Ejector Shutoff
TISL

BATTERY BUS

Altimeter (PNEU)
48 Antiskid/Brakes
ANTISKID Caution Light
Battery Ind Power Test
Bleed Air Control
LESS 48 Brake Hydraulic Circuit (1) (half brakes)
BUC Caution Light
Canopy*
CANOPY Warning Light
Cockpit Spotlights
NO Drag Chute
EEC Caution Light (switch position only)
ELEC SYS caution light
Engine Auto-Lean
Engine History Recorder
57 ENGINE Warning Light
EPU
Fire Overheat Light Bulbs
FLCC (FLT CONT SYS and DUAL FC FAIL lights)
FLCS Power Source
FTIT Indicator
FUEL MASTER Switch
Hook & HOOK Caution Light
Hydraulic/Oil Press Warning Light
Intercom
JFS
LESS 46 LEF's Position Indicator
LG Warning Light (handle)
Main Power Indicator
MAIN PWR Switch
MASTER CAUTION Light
MLG WOW
NLG WOW
Parking Brakes
RPM Indicator
SAI
T.O./LAND CONFIG Warning Light
UHF Radio
Utility Light
57 VWCS

NOTES
*• Power available from battery box bus with MAIN PWR switch OFF
• Nonessential bus is not powered by EPU generator

Figure 1-17. (Sheet 1)

DC Power Distribution

BLOCK 15

ESSENTIAL DC BUS NO. 1

[A] [BF] ALT REL Button
ANTI-ICE Switch
AOA Indexer
AR System
Autopilot
Battery Bus Feeder
Battery Charge Power
CADC Caution Light
CIU
Cockpit Temp Control
Data Control
ECM
EEC Caution Light (EEC faults)
Envir Control Test
FLCP (all lights, reset arm and self-test capability)
FLCS Power Source
Fuel Tank Inerting
IFF
Instrument Mode Select
LEF Motor (1)
LG Down Permission Button
LG Wheels Down Lights
Mal & Ind Light Test/Dim Feature
MASTER ARM Switch
Missile Step Switch
MLG WOW
NUCLEAR CONSENT Switch
NWS
Probe Heat Switch
SCP (left half)
Speedbrakes
Stations 1, 4, 5, 7 & 8 Normal Armed Release
Station 7 Control Power
Stores Jettison (SEL & EMER)
TACAN
VHF Radio
[BR] WPN REL Button

ESSENTIAL DC BUS NO. 2

Autopilot
Auto Fwd Fuel Trans
AVTR
Battery Bus Feeder
LESS (48) Brake Hydraulic Circuit (1) (half brakes)
Camera/Gun Trigger
CIU
ECA
ECS
EQUIP HOT Caution Light
External Fuel Transfer
FUEL LOW Caution Lights
Gun
HUD
ILS
Landing/Taxi/External/ [DE] [NO] [A] ID Light Switches
LEF Motor (1)
LEF & ADC Caution Lights
LG Door Close
LG Hyd Isolation
LG UP-Dn Command
Master Arm Switch
OXY LOW Caution
SCP (right half)
SEAT NOT ARMED Caution Light
Secure Voice
Station 3 Control Power
Stations 2, 3, 6 & 9 Normal Armed Release
Stick Trim
STORES CONFIG Caution Light
Stores Jettison (SEL and EMER)
TWS
[A] [BF] WPN REL Button

NONESSENTIAL DC BUS

FLCS Battery Heater
Inlet Stations (Left & Right)
Station 5 Control Power
TISL

NACELLE DC BUS

Chaff Dispenser
ENGINE FEED Knob
FCR
Flight Loads Recorder
FUEL HOT Caution Light
MAX POWER Switch
Nacelle Ejector Shutoff

BATTERY BUS

Altimeter (PNEU)
(48) Antiskid/Brakes
Antiskid Caution Light
Battery Ind Power Test
Bleed Air Control
LESS (48) Brake Hydraulic Circuit (1) (half brakes)
BUC Caution Light
Canopy*
CANOPY Warning Light
Cockpit Spotlights
[NO] Drag Chute
EEC Caution Light (switch position only)
ELEC SYS Caution Light
Engine Auto-Lean
Engine History Recorder
(57) ENGINE Warning Light
EPU
Fire/Overheat Light Bulbs
FLCC (FLT CONT SYS and DUAL FC FAIL lights)
FLCS Power Source
FTIT Indicator
FUEL MASTER Switch
Hydraulic/Oil Press Warning Light
Hook & HOOK Caution Light
Intercom
JFS
LG Warning Light (handle)
Main Power Indicator
MAIN PWR Switch
MASTER CAUTION Light
MLG WOW
NLG WOW
Overload Trip
Parking Brake
RPM Indicator
SAI
T.O./LAND CONFIG Warning Light
UHF Radio
Utility Light
(57) VWCS

NOTES

*• Power available from battery box bus with MAIN PWR switch OFF
• Nonessential bus and nacelle bus are not powered by EPU generator

Figure 1-17. (Sheet 2)

HYDRAULIC SYSTEM

Hydraulic pressure is supplied by 3000 psi hydraulic systems designated as systems A and B. Refer to figure FO-8. The systems are powered by two independent engine-driven pumps located on the ADG. Refer to figure 1-3. Each system has a reservoir to store hydraulic fluid. The reservoirs are pressurized by their respective hydraulic system to insure positive pressure at the pump. Hydraulic system cooling is provided by a hydraulic fluid-to-fuel heat exchanger which is located upstream from the reservoirs.

Both systems operate simultaneously to supply hydraulic power for the primary flight controls and LEF's. If one of the systems should fail, the remaining system will provide sufficient hydraulic pressure; however, the maximum actuation rate of the FLCS is reduced. System A also supplies power to the FFP and the speedbrakes. All remaining utility functions, consisting of the gun and gun purge door, AR system, LG, brakes, NWS, and **NO** drag chute system, are supplied by system B. System B also charges the brake/JFS accumulators (which provide start power for the JFS and emergency pressure for the brakes), provided the engine is rotating at a minimum of 12 percent rpm. System B requires approximately 1 minute to recharge the accumulators.

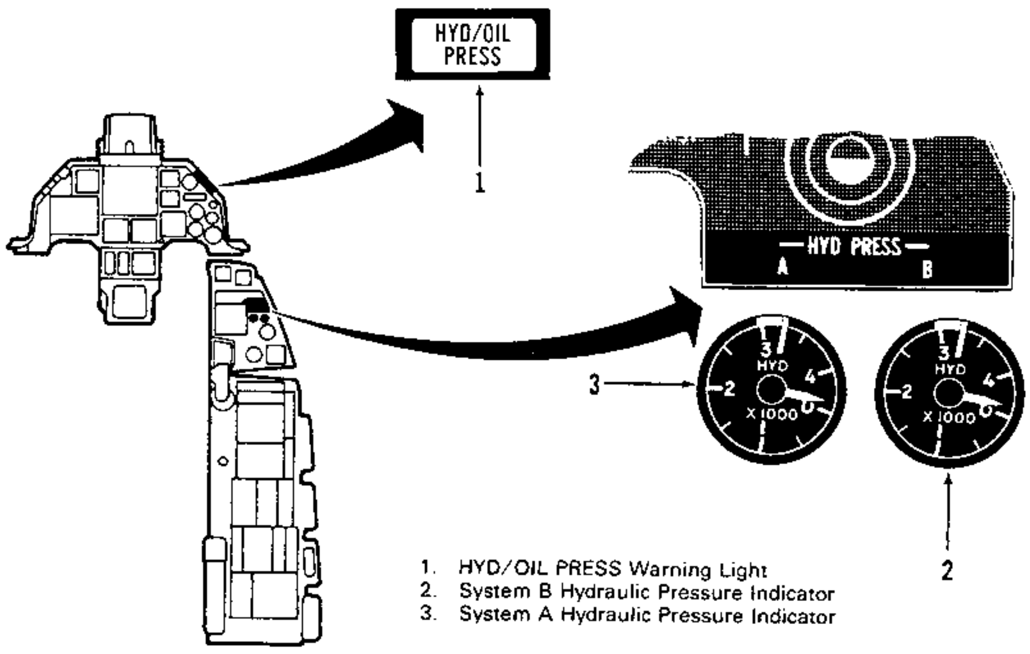
The LG can be extended pneumatically in the event of hydraulic system B failure. Should both hydraulic systems fail, a third hydraulic pump located on the EPU automatically provides hydraulic pressure to system A. (Refer to EMERGENCY POWER UNIT (EPU), this section, and figure FO-9 for a further discussion of the EPU.)

Each hydraulic system has an FLCS accumulator which is isolated from the main system by check valves. These accumulators serve a dual function. If demand exceeds the pump maximum flow rate during rapid control surface movement, the accumulators provide additional hydraulic pressure. Also, if both hydraulic systems fail, the accumulators provide adequate hydraulic pressure to the flight controls while the EPU comes up to speed. For servicing information on the hydraulic system, refer to figure 1-67.

HYDRAULIC PRESSURE INDICATOR AND WARNING LIGHT

Refer to figure 1-18.

Hydraulic Pressure Indicators and Warning Light (Typical)



1. HYD/OIL PRESS Warning Light
2. System B Hydraulic Pressure Indicator
3. System A Hydraulic Pressure Indicator

1F-16A-1-0006

Figure 1-18.

Hydraulic Pressure Indicators

The hydraulic pressure indicators, one for system A and one for system B, are located on the right auxiliary console. The indicators require ac essential power to operate.

HYD/OIL PRESS Warning Light

A HYD/OIL PRESS warning light, located on the right glareshield, comes on when hydraulic system A or B pressure drops below 1000 psi. The warning light also comes on as a function of engine oil pressure. (Refer to ENGINE INSTRUMENTS, this section.) The light is powered by the battery bus.

EMERGENCY POWER UNIT (EPU)

The EPU is a self-contained system (figure FO-9) that simultaneously provides emergency hydraulic pressure to system A and emergency electrical power. The EPU is automatically activated when both hydraulic system pressures fall below 1000 psi or when the main generator disconnects from the bus system. The EPU may be operated manually regardless of failure conditions.

The EPU requires dc power from the battery bus for automatic activation. The EPU can be started manually using power either from the battery bus or the main generator PMG. When the EPU is operating, the essential ac and dc buses are powered by the EPU generator. If the main generator is on the line, the EPU also powers the nonessential dc bus, and the main generator powers the nonessential ac buses. When operating, the EPU augments hydraulic system A as required. If the normal system A hydraulic pump has failed, the EPU is the only source of system A pressure.

The EPU uses engine bleed air and/or hydrazine to operate. Normally, engine bleed air is used to maintain operating speed. When bleed air is insufficient, hydrazine augmentation automatically occurs. Hydrazine is always used when the EPU is commanded to start except when activated during ground test using the EPU/GEN test switch.

On system command, hydrazine is forced by nitrogen pressure into a decomposition chamber. The gaseous products of the reaction spin the turbine/gearbox which then powers the EPU generator and hydraulic pump. Hydrazine exhaust is vented overboard on the lower inboard side of the right strake and consists primarily of nitrogen, hydrogen, ammonia, and water. The temperature of exhaust gases can reach 1600°F and will ignite in the presence of a flame. The exhaust gases have an ammonia odor, are irritating to the nose and eyes, and should be avoided to the maximum extent possible.

EPU CONTROLS AND INDICATORS

Refer to figure 1-19.

EPU Ground Safety Switch

A ground safety switch is located on the right side of the engine inlet and is used to disable the EPU on the ground. With the EPU safety pin installed, the EPU will not operate.

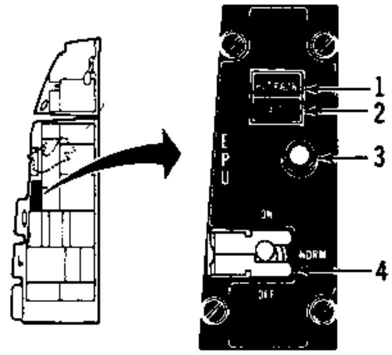
EPU Switch

The EPU switch is a three-position toggle switch.

Functions are:

- OFF
    - Prevents or terminates EPU operation on the ground (WOW).

EPU Control Panel A BF *(Typical)*



1. HYDRAZN Light (Amber)
2. AIR Light (Amber)
3. EPU Run Light (Green)
4. EPU Switch

1F-16A-1-0008

Figure 1-19.

- Will not prevent or terminate EPU operation in flight for main generator failure if switch was cycled or placed to NORM at anytime since takeoff (since WOW).

- Prevents EPU operation in flight if switch has remained in the OFF position since takeoff (since WOW).

- Terminates EPU operation in flight except during main generator failure.

- NORM – The system is armed for automatic operation except during engine shutdown on the ground. With WOW and throttle in OFF, the EPU will not activate when the main generator drops off the line.

- ON – Commands EPU to run regardless of failure conditions. Operation will cease when switch is positioned to OFF except for a main generator failure in flight.

The switch has a split guard; the top half can be raised to move the switch to ON, and the bottom half can be raised to move the switch to OFF. When both sections of the guard are down, the switch is retained in the NORM position.

EPU Run Light

The EPU run light illuminates when the EPU turbine speed is within the proper range and the EPU-driven hydraulic pump discharge pressure is above 2000 psi.

HYDRAZN Light

The HYDRAZN light illuminates when the EPU is commanding hydrazine for operation whether hydrazine is available or not.

AIR Light

The AIR light illuminates whenever the EPU has been commanded to run with the EPU safety pin removed. It remains on even when the EPU is augmented by hydrazine.

EPU/GEN Test Switch

The EPU/GEN test switch (figure 1-6) has positions of OFF and EPU/GEN. The switch is spring-loaded to the OFF position. It provides a means to test the EPU generator and 66 EPU PMG output to FLCS on the ground without using hydrazine.

EPU Fuel Quantity Indicator A BF

The EPU fuel quantity indicator (figure FO-3) is located on the right auxiliary console. The indicator is graduated 0-100 and indicates the percent of hydrazine remaining. The indicator operates on battery bus power.

Hydrazine Leak Detector

The hydrazine leak detector is a silicone base, mustard yellow disc visible through access door 3208 (figure 1-67). The viewing area is black on one half to provide contrast with the mustard yellow disc. The mustard yellow will turn purple/black in the presence of hydrazine and/or its vapors, indicating a leak in the EPU and/or fuel tank system.

EPU Fired Indicator

The EPU fired indicator is located next to the EPU ground safety switch on the right side of the engine inlet. Normally, the indicator displays a gray and black disc. If the EPU has been activated, the indicator displays six equally spaced black and white triangles.

EPU Operation

The EPU is designed to operate automatically for main generator failure, dual hydraulic system failure, PTO shaft or ADG failure, and engine flameout or if the engine is shut down in flight. The EPU can also be activated manually. After receiving any start command, the EPU requires approximately 2 seconds to come up to speed. During this 2-second interval, all equipment not powered by the FLCS inverter batteries or the battery bus will lose power. However, during these 2 seconds, hydraulic pressure for the flight controls will be provided by system B as the engine spools down or by the flight control accumulators. EPU startup may not be audible. Once operating, however, the EPU may be heard but will not sound the same as during the EPU ground check. A lack of sound during EPU startup does not indicate lack of EPU operation which must be confirmed by monitoring the EPU run light. EPU rpm is controlled by three speed controls. The primary and secondary speed controls are based on EPU rpm. The tertiary speed control is based on EPU PMG frequency.

When the EPU is operating, engine thrust settings should be maintained to prevent using hydrazine (as indicated by illumination of the HYDRAZN light). This normally requires a minimum of 75 percent

rpm at sea level. Required thrust settings may be significantly higher at higher pressure altitudes.

If the engine fails, hydrazine alone is used to power the EPU. With hydrazine only, operating time of the system is approximately 10 minutes under normal load requirements. Increased flight control movement will reduce this operating time. When the EPU is the sole source of hydraulic power, EPU loss will result in loss of aircraft control.

LANDING GEAR (LG) SYSTEM

The LG system is normally operated by hydraulic system B. The NLG is extended and retracted by hydraulic pressure. The MLG are retracted hydraulically but are extended by free-fall assisted by airloads. All the LG doors are hydraulically activated with electrical sequencing during retraction and mechanical sequencing during extension. If hydraulic system B fails, the LG may be extended pneumatically.

MAIN LANDING GEAR (MLG)

The two MLG are independent of each other and retract forward with a mechanical wheel twist into two separate wells. Each MLG wheel is equipped with three fusible (thermal pressure relief) plugs.

NOSE LANDING GEAR (NLG)

The NLG retracts aft with a 90-degree mechanical wheel twist into the wheel well. A quick-disconnect at the scissor link is provided so that the nosewheel can be turned beyond the steerable range for towing.

LANDING GEAR CONTROLS AND INDICATORS

Refer to figure 1-20.

Landing Gear Handle

The LG handle has a wheel-shaped grip. Movement of the handle operates electrical switches (powered by essential dc bus No. 2) to command LG retraction or extension. A warning light in the LG handle, powered by the battery bus, illuminates when the LG and doors are in transit or have failed to lock in the commanded position. The warning light also illuminates when all LG are not down and locked, airspeed is less than 170 knots, altitude is less than 10,000 feet, and rate of descent is greater than 250 feet per minute. The handle is locked in the DN position when the aircraft is on the ground. In flight, a signal from the left MLG WOW switch automatically activates a solenoid which unlocks the handle, allowing movement to the UP position. The handle is locked in the UP position to prevent LG extension during high g maneuvers.

Landing Gear Handle Down Permission Button

The LG handle down permission button unlocks the handle electrically to permit movement to the DN position. The button energizes an electrical solenoid which releases the spring-actuated handle lock. The button must be depressed before downward force is applied to the LG handle. The electrical solenoid will not unlock the handle while any appreciable downward force is applied.

Landing Gear Handle Downlock Release Button A BF

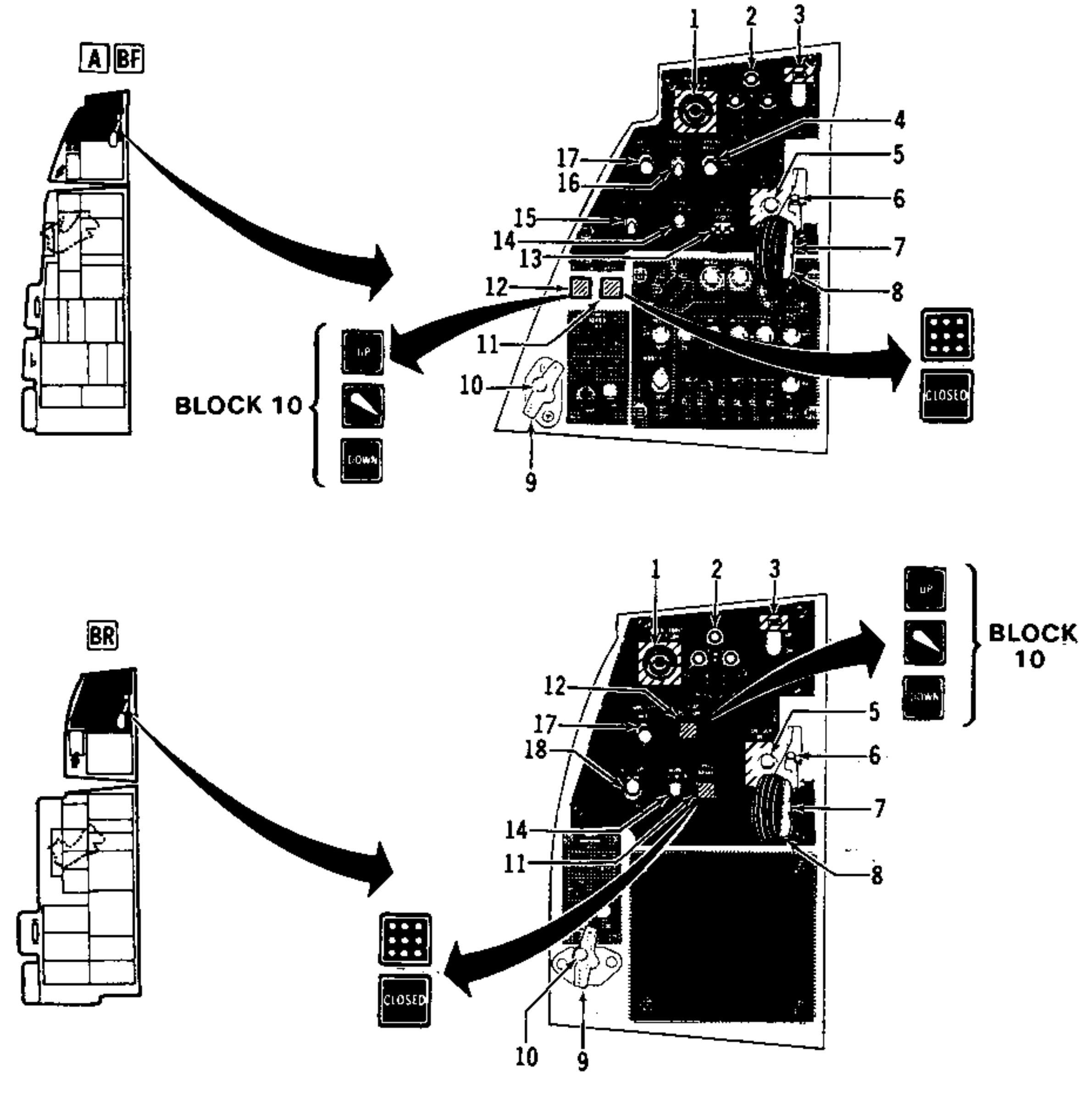
The DN LOCK REL button, when depressed, mechanically unlocks the spring-actuated handle lock if the electrical solenoid should fail or not be powered. It overrides all electrical LG control signals. Depressing this button and raising the LG handle on the ground will retract the LG. The downlock release button will not unlock the LG handle while any appreciable downward force is applied.

Alternate Gear Handle

The ALT GEAR handle is located just outboard and below the LG control panel. The handle is used to extend the LG if normal extension is not possible. Pulling the ALT GEAR handle supplies pneumatic pressure to open all LG doors, extend the NLG, and shut off the LG selector hydraulic valve. The LG/hook emergency pneumatic bottle is also used to lower the hook and contains sufficient pneumatic pressure for one LG extension and to hold the hook down. The bottle cannot be recharged in flight. Since pneumatic pressure is reduced by expansion as the actuators extend, less than the normal extending force is available.

If possible, the normal LG handle should be in the DN position before ALT GEAR handle operation so that other functions controlled by LG handle position (such as brakes and TEF's) may operate normally. An LG reset button is located on the ALT GEAR handle. If an ALT GEAR extension is unsuccessful, depressing the button with the ALT GEAR handle pushed in relieves pneumatic pressure, allowing the LG to be retracted if system B hydraulic pressure is available.

Landing Gear Control Panel (Typical)



1. EMER STORES JETTISON Button (Covered)
2. WHEELS Down Lights (Green)
3. HOOK Switch (Lever Lock)
4. ANTI-SKID Switch (Lever Lock)
5. LG Handle Downlock Release (DN LOCK REL) Button
6. LG Handle Down Permission Button
7. LG Handle
8. LG Handle Warning Light (Red)
9. ALT GEAR Handle
10. ALT GEAR Reset Button
11. SPEEDBRAKE Position Indicator
12. **BLOCK 10** LE FLAP POSITION Indicator
13. LANDING TAXI Light Switch
14. HORN SILENCER Button
15. A BF STORES CONFIG Switch
16. BRAKES Channel Switch
17. GND JETT Enable Switch (Lever Lock)
18. BR ALT FLAPS Switch

Figure 1-20.

LG Warning Horn

The LG warning horn is an intermittent fixed volume signal which sounds in the headset when the NLG or MLG is not down and locked and all the following conditions exist:

- Airspeed is below 170 knots.
- Pressure altitude is less than 10,000 feet.
- Rate of descent is greater than 250 fpm.

HORN SILENCER Button

The HORN SILENCER button is located on the LG control panel. Depressing the button silences the warning horn. If the warning condition is eliminated, the horn will reset. If it is not eliminated, subsequent low speed audio warning will not occur.

T.O./LAND CONFIG Warning Light

The T.O./LAND CONFIG warning light (figure FO-15), located on the left glareshield, illuminates in flight whenever pressure altitude is less than 10,000 feet, airspeed is less than 170 knots, rate of descent is greater than 250 fpm, and either of the following conditions exists:

- TEF's not full down.
- NLG or either MLG not down and locked (accompanied by LG warning horn).

The T.O./LAND CONFIG warning light will illuminate on the ground if TEF's are not full down.

With TEF's full down, rapid reversals of roll command inputs may cause the T.O./LAND CONFIG warning light to momentarily illuminate if the altitude, airspeed, and rate of descent conditions outlined above are met or WOW.

WHEELS Down Lights

The three green WHEELS down lights (figure FO-15) are arranged on the silhouette of the aircraft. When any LG is down and locked, its respective light is on. A safe up and locked LG condition is indicated when all three of the lights and the LG handle warning light are off. The three WHEELS down lights require power from both the battery bus and dc bus No. 1.

Landing Gear Weight-on-Wheels Switches

The LG WOW switches, located on both MLG and on the NLG, operate as a function of LG strut extension to allow or terminate various system functions. Figure 1-21 lists the systems affected by the WOW switches and symptoms of WOW switch failure.

Landing Gear Operation

Movement of the LG handle to the UP position causes the following events:

- LG handle warning light illuminates.
- LG unlocks and retracts.
- Three WHEELS down lights go off.
- MLG wheel spin is stopped by prebraking pressure.
- LG doors close and lock.
- LG handle warning light goes off.
- Hydraulic pressure is removed from LG.
- FLCS switches to cruise gains.
- TEF's retract to streamlined position.
- Electrical power is removed from brake channel 1.
- LG UP nozzle scheduling is activated.

Movement of the LG handle to the DN position causes the following events:

- LG handle warning light illuminates.
- LG doors and LG unlock, extend, and lock into place.
- Three WHEELS down lights illuminate.
- LG handle warning light goes off.
- TEF's extend.
- FLCS switches to takeoff and landing gains.
- LG DN nozzle scheduling is activated.
- Speedbrakes close to 43 degrees if not overridden.
- Electrical power is supplied to brake channel 1.

LG WOW Switch

RIGHT MLG – SYSTEMS

Aircraft Battery	FCR
Altimeter (ELECT)	FLCC
Brakes/Antiskid	FLCP
ECA	Flight Loads Recorder
ECS	LG Warning
Engine Controls	SMS
BLOCK 15 57 A ENGINE Warning Light	Tank Inerting System
EPU	**BLOCK 15** 57 A VWCS

Fails to Ground Position in Flight	Fails to In-Flight Position on Ground
BLOCK 15 57 A ENGINE warning light will be inoperative	**BLOCK 15** 57 A ENGINE warning light will be operative
Flight loads recorder will be inoperative with throttle in IDLE	Flight loads recorder will run on ground
FCR will not transmit	FCR will transmit
Halon tank heater will be inoperative	Halon tank heater will be on
Stores cannot be released/jettisoned unless GND JETT ENABLE switch is placed to ENABLE	Stores can be released/jettisoned with GND JETT ENABLE switch in OFF
BLOCK 15 57 A VWCS will be inoperative	**BLOCK 15** 57 A VWCS will be operative
Brakes can be applied before touchdown if toe brakes are depressed	With simultaneous failure of left MLG WOW switch and ANTI-SKID switch in ANTI-SKID, toe brakes will be inoperative when ground speed is less than 20 knots
ANTI-SKID switch will hold in PARKING BRAKE with throttle in OFF to IDLE range	With simultaneous failure of left MLG WOW switch, ANTI-SKID switch must be held in PARKING BRAKE to operate parking brake
With simultaneous failure of left MLG WOW switch, 66 ACFT BATT FAIL or **LESS** 66 A/C FAIL light indicates aircraft battery failure (voltage 20V or less), cell voltage imbalance, or overheat condition	66 ACFT BATT FAIL or **LESS** 66 A/C FAIL light indicates aircraft battery failure only
	EPU will be commanded on during engine shutdown; operation cannot be terminated with the EPU switch
	Radar cooling valve will be open with radar off
	A/R DISC light will not indicate failure of AR light relay B or C
	CADC light will be on
	FLCS self-test cannot be initiated

Figure 1-21. (Sheet 1)

LG WOW Switch

LEFT MLG - SYSTEMS

Aircraft Battery AOA Transmitters (Both) Brakes/Antiskid **LESS** 80 BUC ECA **BLOCK 15** 57 B ENGINE Warning Light **BLOCK 10** 57 ENGINE Warning Light EPU FLCC	FLCS Batteries FLCP Ground Test Panel (fuel pump lights) JFS Ground Cutout LG Handle LG Warning Total Temperature Probe **BLOCK 15** 57 B VWCS **BLOCK 10** 57 VWCS

Fails to Ground Position in Flight	Fails to In-Flight Position on Ground
AOA probe heaters (both) will be inoperative unless PROBE HEAT selected	AOA probe heaters (both) will be on; ADC, DUAL FC FAIL, CADC, and LE FLAPS lights may be on if AOA probes are not equally positioned
LESS 80 BUC ground test button will engage the BUC inflight	**LESS** 80 BUC ground test button will be inoperative
BLOCK 15 57 B ENGINE warning light will be inoperative	**BLOCK 15** 57 B ENGINE warning light will be operative
JFS will shut down automatically after engine start	JFS will not shut down automatically after engine start
LG UP position cannot be selected unless DN LOCK REL button is depressed	LG UP position can be selected without DN LOCK REL button depressed
T.O./LAND CONFIG warning light will be on with TEF's not down	T.O./LAND CONFIG warning light will not be on with TEF's up
Total temperature probe heater will be inoperative	Total temperature probe heater will be on
BLOCK 15 57 B and **BLOCK 10** 57 VWCS will be inoperative	**BLOCK 15** 57 B and **BLOCK 10** 57 VWCS will be operative
Brakes can be applied before touchdown if toe brakes are depressed	With simultaneous failure of right MLG WOW switch and ANTI-SKID switch in ANTI-SKID, toe brakes will be inoperative when ground speed is less than 20 knots
ANTI-SKID switch will hold in PARKING BRAKE with throttle in OFF to IDLE range	With simultaneous failure of right MLG WOW switch, ANTI-SKID switch must be held in PARKING BRAKE to operate parking brake
	Fuel pump lights on external ground test panel will be inoperative
With simultaneous failure of right MLG WOW switch, 66 ACFT BATT FAIL or **LESS** 66 A/C FAIL light indicates aircraft battery failure (voltage 20V or less), cell voltage imbalance, or overheat condition	66 ACFT BATT FAIL or **LESS** 66 A/C FAIL light indicates aircraft battery failure only
	EPU will be commanded on during engine shutdown; operation cannot be terminated with the EPU switch
	FLCS self-test cannot be initiated
	FLCS batteries will not turn off after shutdown

Figure 1-21. (Sheet 2)

LG WOW Switch

NLG - SYSTEMS

Air Data Probe/Pitot-Static Probe	[66] FLCS Power
[A] AR	NWS
FLCP	Speedbrakes

Fails to Ground Position in Flight	Fails to In-Flight Position on Ground
Air data and pitot-static probe heaters will be inoperative unless selected with PROBE HEAT switch	Air data and pitot-static probe heaters will be on
[A] A/R DISC button will be inoperative	A/R DISC button will be operative
FLT CONT SYS caution light cannot be reset until the servo is reset	FLCS will fail self-test
NWS can be engaged and will follow rudder inputs with NLG down	NWS will be inoperative
Speedbrakes not limited to 43 degrees with NLG down	Speedbrakes will not remain open more than 43 degrees after touchdown
[66] ACFT BATT TO FLCS light indicates aircraft battery bus is supplying power to one or more FLCS branches	[66] ACFT BATT TO FLCS light indicates battery bus is supplying power to one or more FLCS branches (bus voltage 25 vdc or less)
[66] FLCS PMG light indicates FLCS PMG power is not available at one or more FLCS branches	[66] FLCS PMG light indicates the FLCS PMG is not supplying power to any FLCS branches

Figure 1-21. (Sheet 3)

NOSEWHEEL STEERING (NWS) SYSTEM

The NWS is electrically controlled using dc bus No. 1 power and is hydraulically operated using system B pressure. Steering signals are provided through the rudder pedals. Should NWS be engaged with the rudder pedals displaced, the nosewheel will drive to the rudder pedal commanded position. NWS is limited to 32 degrees in each direction; however, turn radius (figure 2-7) can be reduced by using inside brake. NWS is automatically disengaged when the NLG strut is extended. NWS is not available following an alternate LG extension and may not be available anytime the nosewheel WHEELS down light is not illuminated.

NWS CONTROLS AND INDICATORS

Nosewheel Steering/Air Refuel Disconnect/Missile Step Button

The NWS A/R DISC MSL STEP button (figure 1-26) is located on the outboard side of the stick and is used to engage or disengage NWS when the aircraft is on the ground. Once depressed, NWS is engaged and the button may be released. If the button is held depressed, continuous NWS is provided.

NWS Light

The NWS light is the center element of the NWS AR status indicator located on the top of the glareshield

(figure FO-15). The light illuminates when NWS is engaged. NWS will not operate even though the NWS light is illuminated when the NWS FAIL caution light is on or when system B hydraulic pressure is unavailable. On the ground, NWS will continue to operate with the AIR REFUEL switch in OPEN even though the NWS light is off.

NWS FAIL Caution Light

The NWS FAIL caution light is located on the caution light panel (figure FO-15). The NWS FAIL caution light illuminates when the NLG is locked down and a failure in the NWS system has caused electrical power to be switched off.

NOSEWHEEL STEERING (NWS) SYSTEM [B]

The [BR] has the same controls and indicators as the [BF]. Either cockpit of the [B] can control the NWS. Control is accomplished by means of an NWS control button/indicator located in both cockpits just aft of the stick (figure FO-15). Depressing the button/indicator transfers control of the NWS; the indicator illuminates green in the cockpit which has control. Control then remains in that cockpit even if the engine is shut down and electrical power is removed. NWS can only be engaged and operated from the cockpit which has control. When NWS is selected, the AR/NWS light illuminates in both cockpits. The paddle switch on the aft stick allows immediate override of the forward cockpit if the stick control switch is in the AFT position; the NWS control button/indicator in the aft cockpit and OVRD light will illuminate. The front cockpit paddle switch cannot override the aft cockpit regardless of the position of the stick control. When the AIR REFUEL switch is in OPEN, NWS can be engaged or disengaged from either cockpit without using the paddle switch regardless of which cockpit has control.

WHEEL BRAKE SYSTEM

Each MLG wheel is equipped with a hydraulically powered multiple disc brake. The brakes are electrically controlled by conventional toe brake pedals. The amount of braking gradually increases as pedal pressure is applied. A parking brake is also provided. An antiskid system protects against blown tires and is only available when using toe brakes.

[B] Brakes may be applied singly or simultaneously from the forward or rear cockpits. The brake signals from both cockpits are additive so that the total signal to the brakes is the sum of the pedal forces from both cockpits.

Brake hydraulic power is supplied by system B. If system B fails or the engine is operating at less than 12 percent rpm, the toe brakes and parking brake are available until the JFS accumulators deplete. Continuous use of the toe brakes, however, will deplete accumulator fluid and cause loss of all braking capability after approximately 75 seconds (accumulators initially fully charged). When holding the aircraft stationary, use of the parking brake is preferred since accumulator fluid is not depleted.

TOE BRAKE SYSTEM

The toe brakes (figures 1-22 and FO-10) use electrical power from the four FLCS inverters and CHAN 1 and CHAN 2 dc power sources. The brake pedals require FLCS inverter power to operate. The pedal signals are supplied to the brake control box which, in turn, uses both CHAN 1 and CHAN 2 dc power sources to operate valves for controlling hydraulic pressure to the brakes.

The electrical power sources are grouped to provide two redundant channels. Channel 1 uses FLCS inverters A and C and CHAN 1 dc power. Channel 2 uses FLCS inverters B and D and CHAN 2 dc power. If one inverter has failed, one toe brake in either CHAN 1 or CHAN 2 will be inoperative.

Toe Brake System

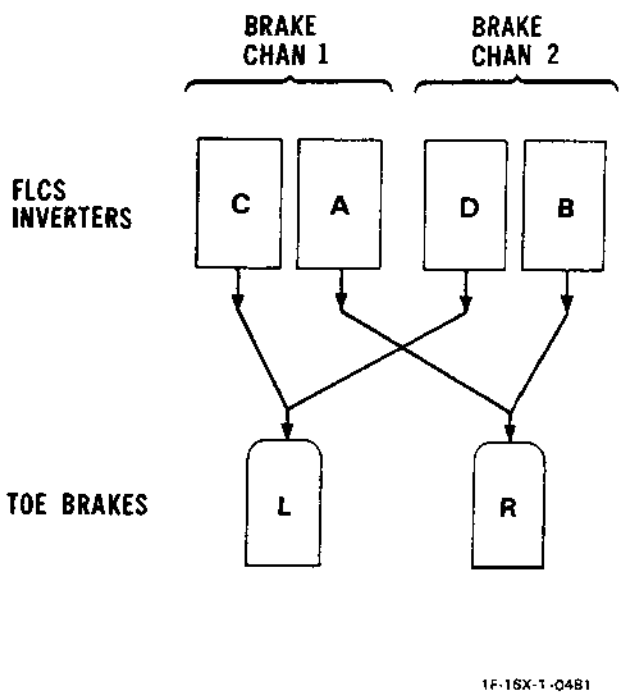


Figure 1-22.

If a dual inverter failure occurs, both brakes in channel 1 or 2 may be inoperative, or one brake in each channel may be inoperative. 66 Inverter failure can be indicated by the FLCS PWR lights on the test switch panel (figure 1-6). Labels adjacent to the lights indicate the brake and channel affected by each failure.

48 CHAN 1 and CHAN 2 dc power sources are on the battery bus.

LESS 48 CHAN 1 dc power source is on the battery bus and CHAN 2 dc power source is on dc bus No. 2. DC bus No. 2 must be available to switch to channel 2. If channel 2 is selected and dc bus No. 2 fails, the brakes will automatically revert to channel 1 even though the channel switch is in the channel 2 position. If channel 2 is selected and the switch is then repositioned to channel 1, the brakes will remain in channel 2 until the LG handle is raised or power is removed from dc bus No. 2.

Regardless of which channel is selected, hydraulic pressure to three of the six pistons in each brake is controlled by electrical power from the CHAN 1 dc power source and pressure to the other three pistons of each brake is controlled by electrical power from the CHAN 2 dc power source. If either of these dc sources fails, only one-half of the pistons are powered and significantly more brake pedal force than normal will be required to stop. If both dc power sources fail or if all FLCS inverters are off, the toe brakes will be totally inoperative.

Channels 1 and 2 use separate redundant circuit elements for controlling the brakes and operate the same except that when CHAN 1 is selected, both dc power sources are switched off when the LG handle is up. With CHAN 1 selected, the brakes only operate with the LG handle down; with CHAN 2 selected, the brakes are operable with the LG handle either up or down. If the LG handle is stuck in the up position, CHAN 2 must therefore be selected to achieve braking.

SPIN DOWN BRAKING SYSTEM

The spin down braking system provides hydraulic brake pressure to stop MLG wheel spin during LG retraction. The hydraulic pressure is relieved when the LG is up and locked.

BRAKES CHANNEL SWITCH

The BRAKES channel switch (figure 1-20), located on the LG control panel, has positions of CHAN 1 and CHAN 2 and allows wheel brake system switching. CHAN 1 is the normal position.

PARKING BRAKE [A] [BF]

The parking brake holds the aircraft stationary without the use of toe brakes. The parking brake is activated by the ANTI-SKID switch (figure 1-20), located on the LG control panel, and supplies full, unmetered pressure to the wheel brakes. It can also be used for emergency braking if the toe brakes are inoperative. The parking brake requires power from the battery bus and system B hydraulics or one JFS accumulator (the accumulator which is not used for START 1).

ANTISKID SYSTEM

The antiskid system is available in either brake channel anytime the toe brakes are powered.

Functions are:

- Touchdown skid control – Prevents brake application prior to wheel spinup even if brake pedals are fully depressed.
- Proportional skid control – Prevents skidding due to overbraking at 5 knots groundspeed or greater.
- Locked wheel skid control – Backs up the proportional skid control and operates at 20 knots groundspeed and greater.
- Antiskid failure detection – Detects an antiskid system malfunction.

If a failure is detected, the ANTI-SKID caution light is illuminated, and the brake system is automatically switched to oscillatory pressure (constant frequency pulsating on-off pressure). In this mode, braking effectiveness is reduced approximately 50 percent; however, braking is better than manual braking (ANTI-SKID switch in OFF). The amount of oscillatory braking is dependent on the toe pressure applied. Oscillatory braking will continue until the ANTI-SKID switch is placed to OFF. At that time, the ANTI-SKID caution light will remain on, and the brake system will revert to manual control. Then the brakes can be locked by applying too much pedal pressure, which may result in blown tires.

The antiskid system will not provide skid or locked wheel protection if MLG wheels are not spinning due to hydroplaning. If WOW occurs prior to spinup of at least one MLG wheel, wheel brakes will become operative without antiskid protection.

ANTI-SKID Switch [A] [BF]

The ANTI-SKID switch (figure 1-20) is located on the LG control panel.

Functions are:

- PARKING BRAKE – Full unmetered brake pressure is applied with the throttle in the OFF to IDLE range and WOW. Advancing the throttle more than 1 inch beyond IDLE automatically releases the parking brakes and returns the switch to ANTI-SKID.
- ANTI-SKID – Antiskid protection is available.
- OFF – Antiskid and parking brake features are deactivated.

ANTI-SKID Caution Light

The ANTI-SKID caution light (figure FO-15), located on the caution light panel, illuminates when a malfunction occurs with the ANTI-SKID switch in ANTI-SKID. It also illuminates when the LG handle is down and the switch is in OFF.

SPEEDBRAKE SYSTEM

The speedbrake system consists of two pairs of clamshell surfaces located on each side of the engine nozzle and inboard of the horizontal tail and is powered by hydraulic system A. The speedbrakes will open to 60 degrees with the LG up. With the LG down, speedbrake opening is limited to 43 degrees to prevent the lower surfaces from striking the runway during landing. This limit can be overridden by holding the SPD BRK switch in the open position. When the NLG strut compresses on landing, the speedbrakes can be fully opened and will remain fully open without holding the SPD BRK switch.

Speedbrake Switch

The SPD BRK switch (figure 1-5), located on the throttle, is a thumb-activated, three-position slide switch. The open (aft) position is spring-loaded to off (center) and allows the speedbrakes to be incrementally opened. The closed (forward) position has a detent, allowing a single motion to close the speedbrakes. To prevent possible creeping, the switch should be left in the closed position.

[B] The speedbrake switches are connected in parallel and function so that either can override the other by holding in the open position. If one switch is in the closed position, the speedbrakes will close when the other is released from the open position.

Speedbrake Position Indicator

The speedbrake position indicator (figure 1-20), located on the LG control panel, is a three-position indicator labeled SPEED BRAKE.

Positions are:

- CLOSED – Both speedbrakes closed.
- Speedbrake symbol – Speedbrakes not closed.
- Stripes – Electrical power removed from the indicator.

DRAG CHUTE SYSTEM [NO]

A drag chute is provided to minimize rollout distance. Chute deployment is obtained when hydraulic system B pressure is routed to the drag chute actuator by positioning the drag chute switch to DEPLOY. Accumulator pressure is available in case of system B failure. Extension of the actuator closes a set of jaws onto the parachute D-ring and pulls the ripcord that releases a spring-loaded pilot chute. The pilot chute functions to pull the main canopy from deployment bag located in an aerodynamic fairing below the rudder. The maximum deployment airspeed of the chute is 170 knots. Deployments above this airspeed may cause chute failure.

The drag chute system has safety provisions for accidental deployments, both commanded and uncommanded. If chute DEPLOY is commanded in flight, the chute can be released by the following means:

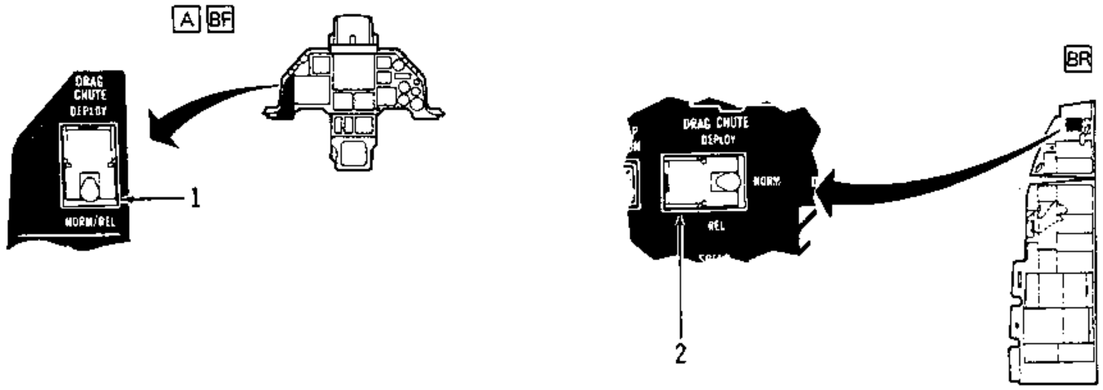
- Above 190 knots – The mechanical fuse section on the D-ring will fail and release the chute.
- Below 190 knots – The chute can be released by cycling the cockpit switch to the [A] NORM REL or [BR] REL position.

If the chute is deployed uncommanded (i.e., ripcord failure) and airspeed is above 60 knots, the D-ring will be pulled out of the jaw mechanism.

DRAG CHUTE Switch

A two-position ([BR] three-position) guarded toggle switch is provided to deploy and release the drag chute. The switch is labeled DRAG CHUTE. Switch positions, location, and functions are shown in figure 1-23. Electrical power is provided from the battery bus.

Drag Chute Controls (Typical) NO



1. A BF DRAG CHUTE Switch
2. BR DRAG CHUTE Switch

1F-16A-1-0062

Figure 1-23.

DRAG CHUTE SWITCH POSITIONS AND FUNCTIONS NO (Refer to figure 1-23)

SWITCH POSITION	FUNCTION
NORM	• Chute stowed • Attachment jaws at midrange
DEPLOY	• Hydraulic actuator extends • Ripcord pulled to release spring-loaded pilot chute • Attachment jaws close on D-ring
REL	• Hydraulic actuator retracts for 2 seconds, releasing the D-ring from the attachment jaws and then returns to midrange

ARRESTMENT SYSTEM

The hook (figure FO-1) is electrically controlled and pneumatically operated. Pneumatic pressure is supplied by the LG/hook emergency pneumatic bottle which contains sufficient pressure to lower the LG and hook. When extended, pneumatic pressure holds the hook on the runway. When subsequently retracted, the hook rises enough to allow the cable to drop off the hook or to be disengaged. Then the hook is spring-loaded to allow taxiing over a cable. The hook must be raised manually to reset it to the stowed position.

HOOK Switch

The HOOK switch (figure 1-20) is located on the LG control panel. The switch is lever-locked in the UP or DN position. Lifting the switch and positioning to DN causes the hook to extend. Returning the switch to UP raises the hook to disengage for taxi over the cable. B Either HOOK switch may be used to extend the hook. Both switches must be positioned to UP to raise the hook.

HOOK Caution Light

The HOOK caution light, located on the caution light panel (figure FO-15), illuminates anytime the hook is not up and locked.

WING FLAP SYSTEM

LEADING EDGE FLAPS (LEF'S)

The LEF's consist of a spanwise flap on each wing leading edge controlled as a function of mach number, AOA, and altitude by command signals from the ECA.

The LEF's are automatically programmed when the LE FLAPS switch is in AUTO except when one or more of the following conditions exist:

- Weight is on both MLG or throttle is at IDLE and MLG wheel speeds are greater than 60 knots. In either case, the LEF's will be 2 degrees up.
- FLCS is operating on standby gains. Refer to STANDBY GAINS, this section.

LE FLAPS Switch

The LE FLAPS switch is covered as a part of the flight control panel. Refer to figure 1-31.

LE FLAP Position Indicator Block 10

A four-position LE FLAP POSITION indicator (figure 1-20) is located just below the lower left corner of the LG control panel.

Displays are:

- UP – LEF's positioned 0-2 degrees up.
- FLAP SYMBOL – LEF's positioned 0-15 degrees down.
- DOWN – LEF's position is greater than 15 degrees down.
- Diagonals – Electrical power removed from indicator. Will also appear momentarily during switching.

LE FLAPS Caution Light

The LE FLAPS caution light (figure FO-15) is located on the caution light panel. The light illuminates for dual air data signal failures (mach number computations), dual AOA failures, and detection of flap command servo failures or when the LE FLAPS switch is positioned to LOCK (figure 1-31). The light may also illuminate after main generator failure. Not all LEF malfunctions will result in illumination of the LE FLAPS caution light.

TRAILING EDGE FLAPS (TEF'S) (FLAPERONS)

The flaperons are located on the wing trailing edge and function as ailerons and TEF's. The flaperons have a maximum command deflection of 20 degrees down and 23 degrees up. When acting as flaps, the deflection is downward; when acting as ailerons, the deflection is up or down, as commanded. Both functions are operable whenever the FLCS is powered. The TEF's are controlled as a function of the LG handle position, the ALT FLAPS switch, airspeed, and mach number. Positioning the LG handle to DN or the ALT FLAPS switch to EXTEND causes the TEF's to deflect downward and the FLCS to switch to takeoff and landing gains. At all airspeeds below 240 knots, the TEF's position will be 20 degrees. Above 240 knots, the TEF's reduce deflection as a function of airspeed until completely retracted at 370 knots.

Alternate Flap Switch

The ALT FLAPS switch (figure 1-20) is located BR on the LG control panel and A BF on the FLCP (figure 1-31). With the switch in NORM, the TEF's are controlled by the LG handle and airspeed. Placing the switch to EXTEND lowers the TEF's only, depending on airspeed. The ALT FLAPS switch does not affect the operation of the LEF's unless the FLCS is operating on standby gains. Refer to STANDBY GAINS, this section.

FLIGHT CONTROL SYSTEM (FLCS)

The FLCS is a computer-controlled, four-channel, fly-by-wire system that hydraulically positions control surfaces. Electrical signals are generated through a stick, rudder pedals, and a manual trim panel. Redundancy is provided in electronic branches, hydraulic systems, and power supplies. A flight control panel (FLCP) provides malfunction indications and controls.

Command signals to the FLCC are initiated by applying force to the stick and rudder pedals. Refer to figures FO-11 and FO-12. These signals are processed by the FLCC along with signals from the air data system, flight control rate gyros, and accelerometers. The processed signals are transmitted to the ISA's of the horizontal tails, flaperons, and rudder which are positioned to give the commanded response.

Pitch motion is controlled by symmetrical movement of the horizontal tails. Roll motion is controlled by differential movement of the flaperons and horizontal tails. Yaw motion is controlled by the rudder. Roll coordination is provided by an ARI.

FLCS LIMITERS

Limiters are provided in all three axes to help prevent departures/spins. Refer to figure 1-24 for limiter values.

AOA/G Limiter

In cruise gains, the AOA/g limiter reduces the positive g available as a function of AOA. The negative g available is a function of airspeed. Below 15 degrees AOA, the maximum positive g available is +9g. As AOA increases, the maximum allowable positive g decreases. The positive g limit and maximum AOA depend on the position of the STORES CONFIG switch. In CAT I, positive g decreases to a value of 1g at 25 degrees AOA (figure 1-25). Maximum commanded AOA is approximately 25.5 degrees. In CAT III, maximum AOA varies from approximately 16-18 degrees as a function of GW and g. The negative g available above approximately 250 knots is -3g. Below 250 knots, the available negative g decreases until below approximately 100 knots, where the maximum negative g available is zero g.

In takeoff and landing gains, the STORES CONFIG switch has no effect on limiting or gains. Maximum positive g is a function of airspeed and AOA. The negative g command limit is not a function of airspeed. It is a fixed limit. The maximum AOA for 1g is approximately 69 21 degrees, **LESS** 69 19 degrees.

In inverted or upright departures, the AOA/g limiter will override stick pitch commands if the MPO is not engaged. The MPO can always override the negative g function of the limiter. It can also override the AOA function of the limiter when the AOA is above 29 degrees. Refer to MPO, this section.

Roll Rate Limiter

In cruise gains, the roll rate limiter reduces available roll rate authority to help prevent roll coupled departures. This authority is reduced as airspeed decreases, AOA increases, or trailing edge down horizontal tail deflection increases. In takeoff and landing gains, roll rate limiting is available but is a fixed value independent of AOA, airspeed, or horizontal tail position.

Rudder Authority Limiter

In cruise gains, the rudder authority limiter reduces the pedal commanded rudder deflection as a function of AOA, roll rate, and STORES CONFIG switch position for departure protection. However, ARI authority, stability augmentation, and trim authority are not reduced. In takeoff and landing gains, category I rudder authority limiting is provided.

Yaw Rate Limiter

When AOA exceeds 29 degrees, the yaw rate limiter overrides stick roll inputs. The yaw rate limiter provides rudder against and flaperon with the yaw rate until AOA is below 29 degrees to enhance spin resistance. The yaw rate limiter is not functional for inverted departures; below 29 degrees AOA, the yaw rate limiter provides no protection against yaw departure.

FLCS Limiter Functions

	PITCH AXIS	ROLL AXIS	YAW AXIS
CAT I	Maxiumum AOA=25° g command system until 15° AOA g/AOA command system above 15° AOA	Maximum roll rate command decreases with: • AOA above 15° • Airspeed less than 250 knots • Horizontal tail deflection more than 5° trailing edge down	Maximum deflection (pedal command) reduced for: • AOA>14° (zero roll rate) • Roll rate>20°/sec **NOTE** Zero rudder authority available at 26° AOA
CAT III	Maximum AOA=16°-18° (Depending on GW) g command system until 7° AOA at 100 knots to 15° AOA at 420 knots and above g/AOA command system above these values	Maximum roll rate command reduced by approximately 40% of CAT I authority. Additional decreases as function of AOA, airspeed, and horizontal tail position	Maximum deflection (pedal command) reduced for: • AOA>3° (zero roll rate) • Roll rate>20°/sec **NOTE** Zero rudder authority available at 15° AOA
NOTES	1. 69 In takeoff/landing gains, the FLCS operates as a pitch rate command system until 10° AOA and a pitch rate/AOA command system above 10° AOA 2. **LESS** 69 In takeoff/landing gains, the FLCS operates as a g/AOA command system at all times 3. +9g available until 15° AOA. Max g decreases as a function of AOA and airspeed	In takeoff/landing gains, maximum roll rate is fixed at approximately one-half the maximum roll rate available in cruise gains, regardless of AOA, airspeed, or horizontal tail deflection	1. Above 29° AOA, the yaw rate limiter cuts out stick roll inputs and provides antispin control inputs 2. Above 29° AOA with MPO engaged, pedal-commanded rudder deflection is possible 3. Max deflection (30°) always available thru ARI and stability augmentation

Figure 1-24.

AOA/G Limiter Function (Cruise Gains)

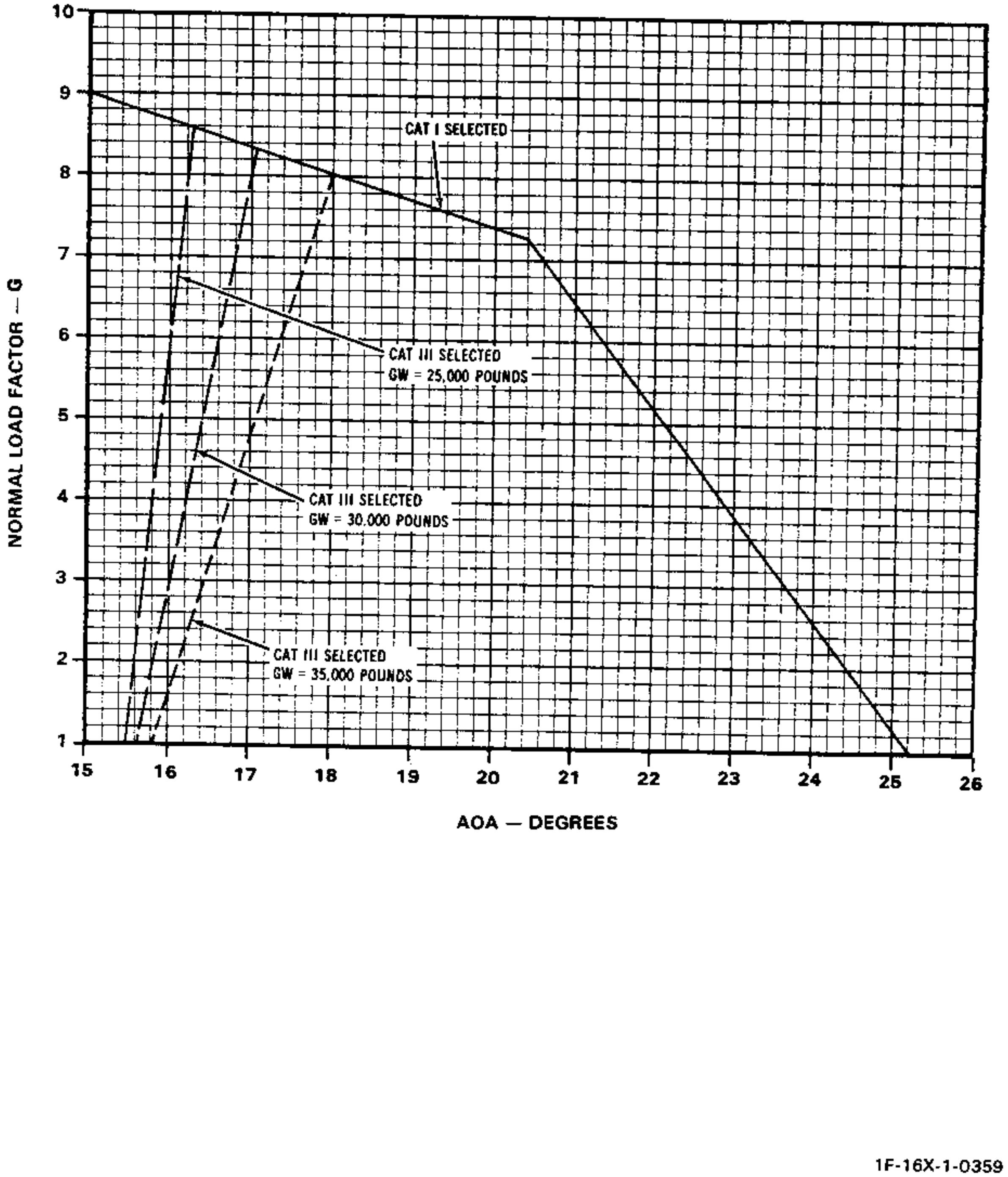


Figure 1-25.

FLCS GAINS

During normal operation, the FLCS receives inputs (gains) from the ADC and provides relatively constant aircraft response for a given stick input, regardless of altitude or airspeed. This response varies slightly depending on configuration. In the event of a dual air data failure, the FLCS will switch to standby (fixed) gains.

Cruise Gains

The FLCS is in cruise gains with the LG handle in UP, the ALT FLAPS switch in NORM, and the AIR REFUEL switch in CLOSE. At low AOA, the pitch axis of the FLCS is a g command system. As AOA increases, the FLCS switches to a blended g and AOA system to provide a warning of high AOA/low airspeed. Roll rate limiting is available and maximum roll rate decreases as a function of low airspeed, high AOA, and horizontal tail position.

Takeoff and Landing Gains

The FLCS is in takeoff and landing gains with the LG handle in DN, the ALT FLAPS switch in EXTEND, or the AIR REFUEL switch in OPEN. In takeoff and landing gains, 69 the FLCS pitch axis operates as a pitch rate command system until 10 degrees AOA and a blended pitch rate and AOA command system above 10 degrees AOA; **LESS** 69 the FLCS pitch axis operates as a combination of g and AOA at all times. Roll rate limiting is available but is a fixed value independent of AOA, airspeed, or horizontal tail position.

Standby Gains

In standby gains, control response is tailored for a fixed altitude (sea level, standard day) and airspeed (LG handle in UP, approximately 600 knots; LG handle in DN, approximately 230 knots). The following lights illuminate: STBY GAINS, ADC, LE FLAPS, and FLT CONT SYS. The ADC light may reset depending on the failure.

When operating on standby gains, the LEF's will be at zero degrees with the LG handle in UP and the ALT FLAPS switch in NORM. The LEF's deflect 15 degrees down if the LG handle is in DN or the ALT FLAPS switch is in EXTEND. The operation of the TEF's is not affected in standby gains.

The STBY GAINS light cannot be reset in flight, and the FLCS continues to operate on fixed gains even if the failure clears. The light may reset when weight is on the MLG.

FLCS DATA RECORDER

The FLCS data recorder retains the same information as the recorders in the FLCC and ECA including FLCS failure data, control surface position data, airspeed, altitude, AOA, and elapsed time from takeoff. A frame of data can be stored in the FLCS data recorder at anytime in flight by depressing the FCS CAUTION RESET button. This information is particularly valuable in determining the origin of abnormal FLCS response. The FCS CAUTION RESET button should be used sparingly under these circumstances since memory capacity is limited. The FLCS data recorder is attached to the A BF ejection seat (figure 1-39) and departs the aircraft on ejection.

GUN COMPENSATION

The FLCS automatically compensates for the off-center gun and the aerodynamic effects of gun gas emissions during firing by moving the flaperons and rudder. Gun compensation is optimized for 0.7-0.9 mach range; therefore, all excursions may not be eliminated. For example, gunfiring at low mach will likely result in nose left excursions while nose right excursions are likely at higher mach. Failure monitoring of gun compensation circuits is not provided and there are no caution light indications for incorrect compensation.

FLIGHT CONTROL SYSTEM (FLCS) CONTROLS

Stick

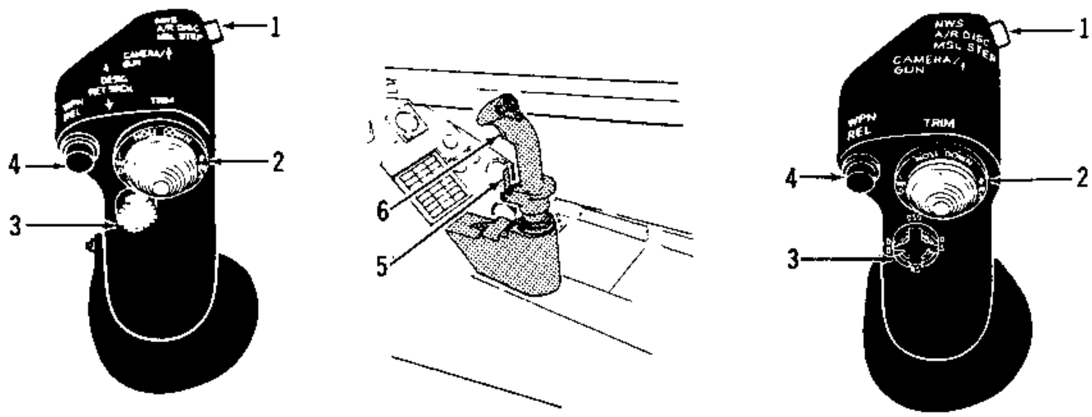
The stick (figure 1-26) is a force-sensing unit which contains transducers in both pitch and roll axes, moves approximately 1/4 inch in both axes, and is rotated slightly cw.

Maximum noseup and nosedown pitch commands are generated by 25 and 16 pounds of input, respectively. Roll commands are generated by a maximum of 17 pounds in cruise gains and by 12 pounds in takeoff and landing gains. When using the switches on the stick, inadvertent inputs to the FLCS are possible.

A wristrest assembly which may be used in conjunction with the stick is located on the right side wall aft of the stick.

Stick (Typical)

TOP VIEW



BLOCK 10 BLOCK 15

1. NWS A/R DISC MSL STEP Button
2. TRIM Switch (4-Way, Momentary)
3. **BLOCK 10** DESIG RET SRCH Switch (2-Way, Momentary)
   BLOCK 15 DSG RS DO DS Switch (4-Way, Momentary)
4. WPN REL Button
5. Paddle Switch
6. CAMERA/GUN Trigger (2-Position)

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Figure 1-26.

STICK CONTROLS (Refer to figure 1-26)

CONTROL	POSITION	FUNCTION
1. NWS A/R DISC MSL STEP Button (NWS)	Depress (on ground)	Activates NWS
	Depress (2nd time)	Deactivates NWS
(A/R DISC)	Depress (in flight)	Disconnects boom latching. AIR REFUEL switch must be in OPEN position
(MSL STEP)	Depress (in flight)	Activates missile step function. Refer to T.O. 1F-16A-34-1-1
2. TRIM Switch (NOSE DOWN)	Fwd	Trims nosedown
(NOSE UP)	Aft	Trims noseup
(LWD)	Left	Trims left wing down
(RWD)	Right	Trims right wing down

STICK CONTROLS – Continued

CONTROL	POSITION	FUNCTION
3. DESIG RET SRCH Switch Block 10 (DESIG)	Up	Commands radar to lock on, designate a target, and perform other avionic operations
(RET SRCH)	Down	Commands radar to reject target and return to search mode
3. DSG RS DO DS Switch Block 15 (DSG)	Up	Commands radar to lock on, designate a target, and perform other avionic operations
(RS)	Down	Commands radar to reject target and return to search mode
(DO)	Left	Not functional
A (DS)	Right	Not functional
B (DS)	Right	Functional. Refer to figure 1-66
4. WPN REL Button	Depress	Signals consent to FCC or SMS to initiate weapon release and operates AVTR/CTVS when in AUTO
5. Paddle Switch	Depress	Interrupts the autopilot while switch is depressed
		B For stick override function, refer to F-16B AIRCRAFT, this section
6. CAMERA/GUN Trigger (2-position)	Squeeze trigger (1st detent)	Starts operation of AVTR/CTVS with AUTO selected on camera power control switch
	Squeeze trigger (2nd detent)	Fires gun (if selected and armed) and AVTR/CTVS operation continues

Rudder Pedals

The rudder pedals are force-sensing units containing transducers. Force on the applicable rudder pedal produces electrical yaw command signals.

The rudder pedals are also used to generate brake and NWS signals. Rudder pedal feel is provided by mechanical springs.

Manual Trim Panel

The manual trim panel (figure 1-27), located on the left console, contains trim controls and indicators.

Flight Control Panel (FLCP)

The FLCP (figure 1-31), located on the left console, contains indicators and controls related to flight control functions.

MANUAL PITCH Override (MPO) Switch

The MPO switch (figure 1-28) has two positions, NORM and OVRD, and is spring-loaded to the NORM position. This switch is used during a deep stall condition to enable manual control of the horizontal tail. Positioning and holding the switch to OVRD overrides the negative g limiter. If the AOA is greater than 29 degrees, it overrides the AOA/g limiter and allows rudder inputs.

STORES CONFIG Switch A BF

The STORES CONFIG switch (figure 1-29) has two positions, CAT I and CAT III. The CAT I position should be selected when the aircraft is configured with a category I loading. The CAT III position is selected when the aircraft is configured with a category III loading. **LESS** 47 Category II loadings can be flown with the STORES CONFIG switch in either CAT I or CAT III position. However, with the switch in CAT I position, AOA monitoring will be required to observe the category II maneuver limits of figure 5-9.

AOA limiting is provided. Refer to FLCS LIMITERS, this section, for a description of categories I and III AOA limiter.

FLCS WARNING, CAUTION, AND INDICATOR LIGHTS

The instrument panel, right auxiliary console, the FLCP, and 66 test switch panel contain warning, caution, and indicator lights related to the FLCS.

DUAL FC FAIL Warning Light

The DUAL FC FAIL warning light (figure FO-15), located on the right upper edge of the glareshield, illuminates to indicate that a dual malfunction has occurred in one of the electrical control axes, in an ISA, or in the air data system. The FLT CONT SYS caution light and associated indicator lights on the FLCP also illuminate.

T.O./LAND CONFIG Warning Light

Refer to LANDING GEAR SYSTEM, this section.

FLT CONT SYS Caution Light

The FLT CONT SYS caution light (figure FO-15), located on the caution light panel, illuminates when a failure occurs in the FLCS. Associated FLCP indicator lights will also illuminate. With WOW, if a servo light illuminates with the FLCS not in self-test, the FLT CONT SYS caution light cannot be reset until the servo is reset.

Flight Control Panel (FLCP) Indicator Lights

Refer to figure FO-15 for the indicator lights located on the FLCP.

Low Speed Warning Signal

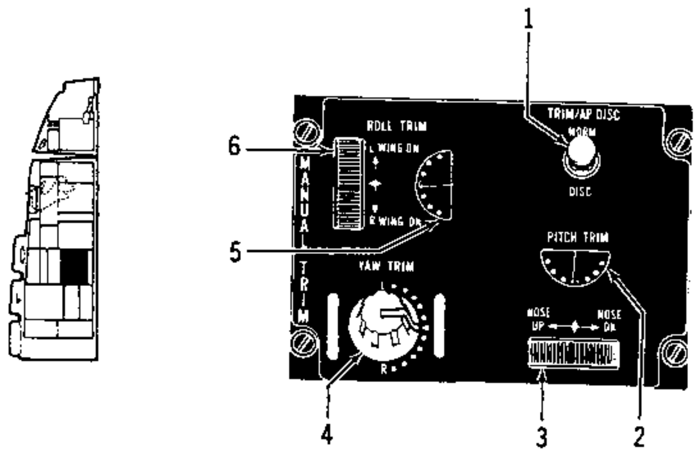
A low speed warning signal (steady tone) sounds in the headset when either of the following conditions exists:

- AOA is greater than 15 degrees with the LG handle in DN or the ALT FLAPS switch in EXTEND.
- 37 Combined airspeed and pitch angle fall on a point within the shaded area of figure 1-30 with the LG handle in UP and the ALT FLAPS switch in NORM.
- **LESS** 37 Airspeed is less than 120 (±10) knots with the LG handle UP and the ALT FLAPS switch in NORM.

The low speed warning signal has priority over the LG warning horn. Depressing the horn silencer button silences the warning horn.

The warning horn is reactivated only after the original warning condition is eliminated. The MAL & IND LTS test button does not test the low speed warning tone.

Manual Trim Panel A BF (Typical)



1. TRIM/AP DISC Switch
2. PITCH TRIM Indicator
3. PITCH TRIM Wheel
4. YAW TRIM Knob
5. ROLL TRIM Indicator
6. ROLL TRIM Wheel

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Figure 1-27.

MANUAL TRIM PANEL CONTROLS AND INDICATORS (Refer to figure 1-27)

CONTROL	POSITION	FUNCTION
1. TRIM/AP DISC Switch	NORM	Energizes stick trim button. Permits autopilot engagement
	DISC	Deenergizes stick trim button, prevents autopilot engagement, and deactivates trim motors (manual trim wheels still operative)
2. PITCH TRIM Indicator	Visual	Indicates pitch trim
3. PITCH TRIM Wheel	NOSE UP rotation	Trims noseup
	NOSE DN rotation	Trims nosedown

MANUAL TRIM PANEL CONTROLS AND INDICATORS – Continued

CONTROL	POSITION	FUNCTION
4. YAW TRIM Knob	CCW rotation	Trims nose left
	CW rotation	Trims nose right
5. ROLL TRIM Indicator	Visual	Indicates roll trim
6. ROLL TRIM Wheel	L WING DN rotation	Trims left wing down
	R WING DN rotation	Trims right wing down

Manual Pitch Override Switch (Typical)

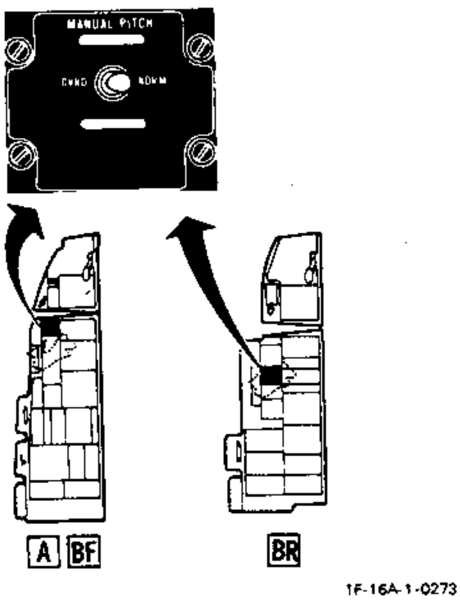

Figure 1-28.

STORES CONFIG Switch A BF (Typical)

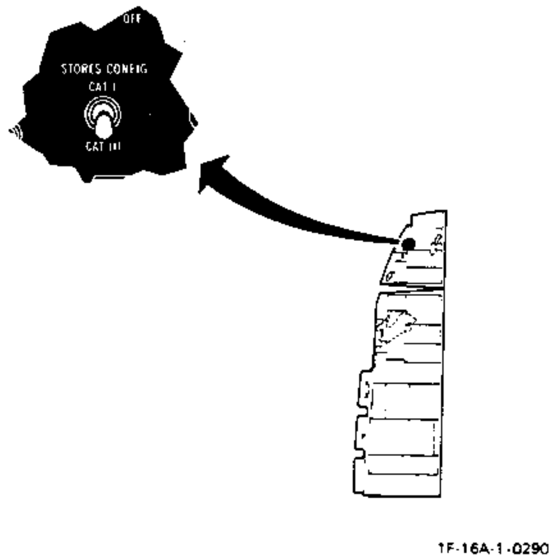

Figure 1-29.

Airspeed/High Pitch Attitude Schedule

37

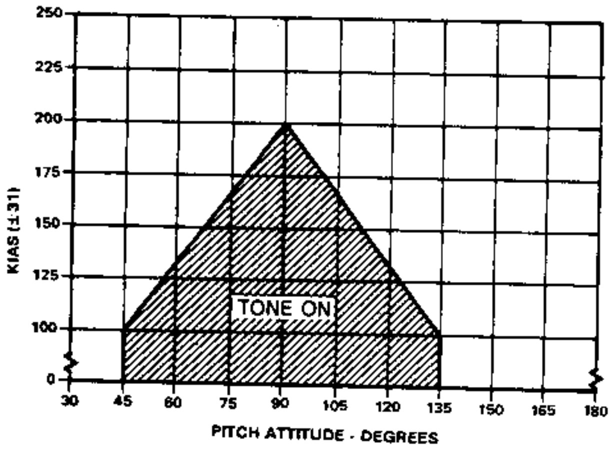

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Figure 1-30.

TRIM

Pitch trim inputs may be initiated from either the trim button on the stick or the pitch trim wheel on the manual trim panel. In cruise gains, pitch trim inputs are g command signals identical in function to normal stick pitch commands. In takeoff and landing gains, 69 the FLCS operates as a pitch rate command system until 10 degrees AOA and a pitch rate and AOA command system above 10 degrees AOA; **LESS** 69 the FLCS switches to a blended normal acceleration and AOA command system.

LESS 69 Pitch transients occur during LG extension or retraction. These transients are minimized if LG is extended or retracted near 6 degrees AOA.

With WOW on both MLG and both main wheel speeds at 60 knots groundspeed or greater, pitch trim will automatically drive to center.

Roll trim inputs can be initiated from either the trim button on the stick or the roll trim wheel on the manual trim panel. For asymmetric configurations or rudder mistrim, roll retrimming may be required as flight conditions change. Roll trim inputs also command proportional rudder deflection through the ARI function.

Rudder trim is initiated from the YAW TRIM knob on the trim panel only. For asymmetric configurations or roll mistrim, rudder retrimming may be required as flight conditions change.

AUTOPILOT

The autopilot (figure 1-31) provides attitude hold and heading select in the roll axis and attitude hold and altitude hold in the pitch axis. These modes are controlled by five switches. The trim-autopilot disconnect switch is on the manual trim panel and the paddle switch is on the stick. The AUTOPILOT switch is solenoid held in the ON position and will go to the OFF position if any of the following conditions exist:

Conditions are:

- LG handle - DN.
- ALT FLAPS switch - EXTEND.
- STBY GAINS light - ON.
- TRIM/AP DISC switch - DISC.
- AIR REFUEL switch - OPEN.

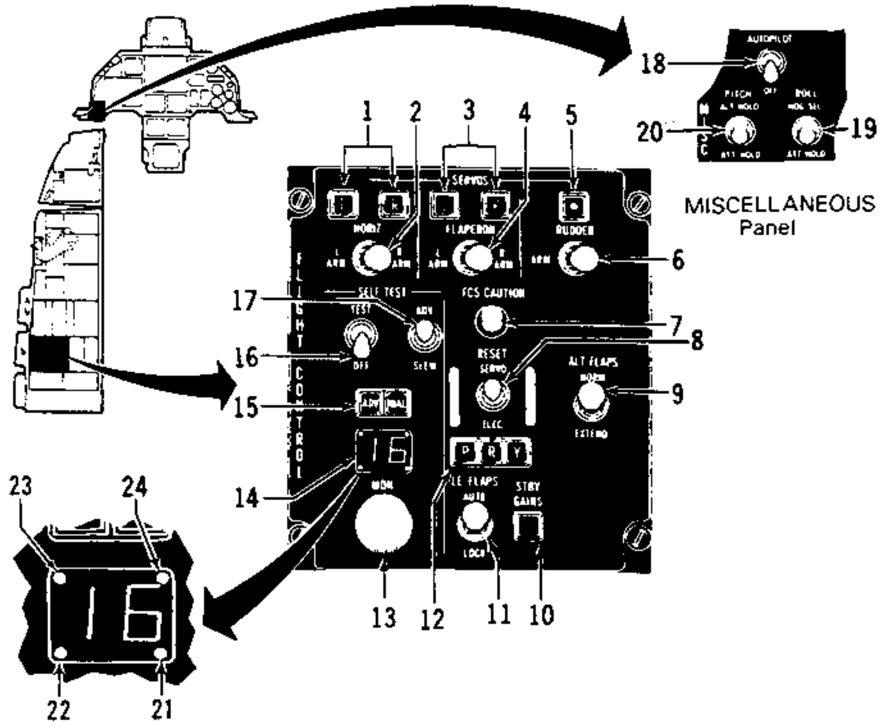
The ROLL and PITCH switches are two-position switches that allow mode selection. Any combination may be selected.

AUTOPILOT OPERATION

Positioning the AUTOPILOT switch to AUTOPILOT will permit use of roll and/or pitch autopilot functions. Autopilot options are selected by positioning the PITCH switch (ATT HOLD or ALT HOLD) and/or the ROLL switch (ATT HOLD or HDG SEL).

Stick trim is inoperative with the autopilot engaged. The manual trim is operable and may be used while the autopilot is engaged. However, due to the limited authority of the autopilot, engagement of any mode in other than a trimmed flight condition degrades autopilot performance. The autopilot will not function if pitch or roll angle exceeds ±60 degrees.

Flight Control Panel A BF *(Typical)*



1. HORIZ Tail Servo Status Light
2. HORIZ Tail Servo Arm Switch
3. FLAPERON Servo Status Light
4. FLAPERON Servo Arm Switch
5. RUDDER Servo Status Light
6. RUDDER Servo Arm Switch
7. FCS CAUTION RESET Button
8. SERVO ELEC RESET Switch
9. ALT FLAPS Switch (Lever Lock)
10. STBY GAINS Light
11. LE FLAPS Switch
12. Pitch, Roll, and Yaw Status Light
13. Test Monitor Receptacle
14. Test Number
15. Test ADV MAL Light
16. SELF TEST Switch
17. ADV SLEW Switch
18. AUTOPILOT Switch
19. Autopilot ROLL Switch
20. Autopilot PITCH Switch
21. FLCC Data Word Dot Light
22. ECA Data Word Dot Light
23. Spare
24. Rate Gyro Speed Detect Dot Light

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Figure 1-31.

FLIGHT CONTROL SYSTEM CONTROLS AND INDICATORS (Refer to figure 1-31)

CONTROL/INDICATOR	POSITION/INDICATION	FUNCTION
1. L HORIZ Tail Servo Status Light	On	Indicates first failure of left horizontal ISA
R HORIZ Tail Servo Status Light	On	Indicates first failure of right horizontal ISA
2. HORIZ Tail Servo Arm Switch	L ARM	Arms servo monitor. Subsequent failure in left ISA will position left horizontal tail to neutral, will lock out roll commands to the right horizontal tail, and will illuminate the DUAL FC FAIL warning light

FLIGHT CONTROL SYSTEM CONTROLS AND INDICATORS – Continued

CONTROL/INDICATOR	POSITION/INDICATION	FUNCTION
2. HORIZ Tail Servo Arm Switch – continued	Center	Normal position
	R ARM	Arms servo monitor. Subsequent failure in right ISA will position right horizontal tail to neutral, will lock out roll commands to the left horizontal tail, and will illuminate the DUAL FC FAIL warning light
3. L FLAPERON Servo Status Light	On	Indicates first failure of left flaperon ISA
R FLAPERON Servo Status Light	On	Indicates first failure of right flaperon ISA
4. FLAPERON Servo Arm Switch	L ARM	Arms servo monitor. Subsequent failure in left ISA will position left flaperon to neutral, will lock out TEF commands to both flaperons, and will illuminate the DUAL FC FAIL warning light
	Center	Normal position
	R ARM	Arms servo monitor. Subsequent failure in right ISA will position right flaperon to neutral, will lock out TEF commands to both flaperons, and will illuminate the DUAL FC FAIL warning light
5. RUDDER Servo Status Light	On	Indicates first failure of rudder ISA
6. RUDDER Servo Arm Switch	ARM	Arms servo monitor. Subsequent failure of ISA will position rudder to neutral and will illuminate the DUAL FC FAIL warning light
	Not Armed (center)	Normal position
7. FCS CAUTION RESET Button	Push	Resets FLT CONT SYS caution light so that subsequent failures can be indicated and gives consent to allow SERVO reset. Also resets MASTER CAUTION light caused by FLT CONT SYS caution light illumination. Depressing FCS CAUTION RESET button in flight also causes the FLCS data recorder to store a frame of data

FLIGHT CONTROL SYSTEM CONTROLS AND INDICATORS – Continued

CONTROL/INDICATOR	POSITION/INDICATION	FUNCTION
8. SERVO ELEC RESET Switch (momentary)	SERVO	Resets all failed ISA's when the FCS CAUTION RESET button is depressed simultaneously (and illuminates five SERVO lights to test bulbs)
	Center (spring-loaded)	Normal position
	ELEC	Resets malfunctioning pitch, roll, yaw, ADC, LE FLAPS, and CADC electronics. Also resets FLT CONT SYS and MASTER CAUTION lights
9. ALT FLAPS Switch (lever lock)	NORM	TEF's operation controlled by LG handle
	EXTEND	TEF's extend regardless of LG handle position
10. STBY GAINS Light	On	Indicates FLCS is operating on standby gains
11. LE FLAPS Switch	AUTO	LEF's are automatically controlled as a function of mach number, altitude, and AOA
	LOCK	Locks LEF's in present position and illuminates LE FLAPS caution light
12. Pitch, Roll, and Yaw Status Lights	P	Indicates signal malfunction in pitch control electronics
	R	Indicates signal malfunction in roll control electronics
	Y	Indicates signal malfunction in yaw control electronics
	P, R, and Y	Indicate loss of power to one or more FLCS branches
13. Test Monitor Receptacle	CAPPED	Connection for external test equipment
14. Test Number	00	Indicates step number of test being performed

FLIGHT CONTROL SYSTEM CONTROLS AND INDICATORS – Continued

CONTROL/INDICATOR	POSITION/INDICATION	FUNCTION
15. Test ADV MAL Light	MAL	If accompanied by a dot light, indicates a malfunction in the FLCS has been detected during self-test
	ADV	Indicates a stop in test program which requires manual advance
16. SELF TEST Switch	TEST	Initiates FLCS self-test
	OFF	Deenergizes self-test circuits
17. ADV SLEW Switch	ADV	Advances the test program after a stop in test procedure
	SLEW	Advances the test sequence approximately one test number per second
18. AUTOPILOT Switch	AUTOPILOT	Engages autopilot which provides attitude hold, altitude hold, and heading select functions
	OFF	Disengages autopilot functions
19. Autopilot ROLL Switch	ATT HOLD	Autopilot maintains roll attitude as determined by INS
	HDG SEL	Autopilot turns the aircraft to capture and maintain the heading selected by the heading reference marker on the HSI
20. Autopilot PITCH Switch	ATT HOLD	Autopilot maintains constant pitch attitude as determined by INS
	ALT HOLD	Autopilot maintains constant altitude as determined by CADC
21. FLCC Data Word Dot Light	On	Indicates failure in FLCC
22. ECA Data Word Dot Light	On	Indicates failure in ECA
23. Spare	–	–
24. Rate Gyro Speed Detect Dot Light	On	Indicates rate gyro failure

There are no caution light indications of autopilot operation, malfunction, or disconnect. The autopilot does not include the redundancy of the FLCS so its use must be closely monitored at low altitude or in close formation.

Positioning the PITCH switch to ALT HOLD enables the FLCS to use CADC information to generate commands to the horizontal tails which result in the aircraft maintaining a constant altitude. The FLCS limits the pitch command to +0.5g-+2g. Engagement of altitude hold at rates of climb or dive less than 2000 fpm will select an altitude within the pitch command g limits. Engagement above rates of 2000 fpm causes no unsafe maneuvers; however, the engaged altitude may not be captured. Control accuracy of ±100 feet is provided to 40,000 feet pressure altitude for normal cruise conditions. The altitude reference may be changed by depressing the paddle switch, changing altitude, and releasing the paddle switch. ALT HOLD in the transonic region may be erratic.

Positioning the PITCH switch to ATT HOLD disengages the CADC and an attitude signal from the INU is used to maintain the selected pitch attitude.

Positioning the ROLL switch to HDG SEL allows the FLCS to use a signal from the HSI to maintain the heading set on the HSI. Adjusting the HSI heading reference marker to the aircraft heading prior to engagement will maintain the existing aircraft heading. When the autopilot is engaged with the roll mode switch in HDG SEL, the aircraft will turn to capture the heading indicated by the heading reference marker on the HSI. The roll command will not exceed a 30-degree bank angle or a 20-degree/second roll rate.

Positioning the ROLL switch to ATT HOLD routes an attitude signal from the INU to the FLCS which results in the aircraft maintaining the selected roll attitude.

STICK STEERING

Stick steering is operable only with the pitch and roll attitude hold modes. Stick steering operation is accomplished by applying force to the stick. With ATT HOLD mode selected, a force applied in the appropriate axis large enough to activate stick steering causes the autopilot to drop the selected reference and the system will accept manual inputs from the stick.

AOA SYSTEM

The system consists of two conical AOA transmitters located on each side of the nose radome, AOA ports on the fuselage-mounted air data probe, an ADC, an AOA correction device in the CADC, an AOA indexer, and a vertical scale AOA indicator. In flight, the airflow direction is sensed by the conical AOA probes and the AOA ports of the fuselage-mounted air data probe. The AOA signals from all three sources are sent to the ADC for comparison and correction to true AOA which is used for LEF scheduling. A true AOA signal is sent from the ADC to the FLCC and is used for stabilization and AOA/g limiting. The CADC converts an indicated AOA signal received from the ADC to a second true AOA signal (figure FO-13) for use by the AOA indexer, the AOA indicator, and other avionics equipment.

AOA Indicator

The AOA indicator (figure 1-32), located on the instrument panel, displays actual AOA in degrees. The indicator has a vertically moving tape display indicating an operating range of –5 to approximately +32 degrees. The tape is color coded from 9-17 degrees to coincide with the color-coded symbols on the AOA indexer.

AOA Indexer

The AOA indexer (figure 1-32), located on the top left side of the glareshield, consists of three color-coded symbols arranged vertically. The indexer provides a visual head-up indication of aircraft AOA by illuminating the symbols individually or in combinations as shown in figure 1-32. The indexer lights display AOA correction (based on approximately 13 degrees AOA). This correction may be used during landing approaches as visual direction toward optimum landing AOA. Although the AOA indexer operates continuously with the LG handle up or down, the HUD AOA display is only available with the LG handle down or ILS selected.

A dimming lever, located on the side of the indexer, controls the intensity of the lighted symbols.

The indexer lights are tested by activation of the MAL & IND LTS switch on the test switch panel (figure 1-6). The test should be performed with the dimming lever in the bright position.

AOA Displays

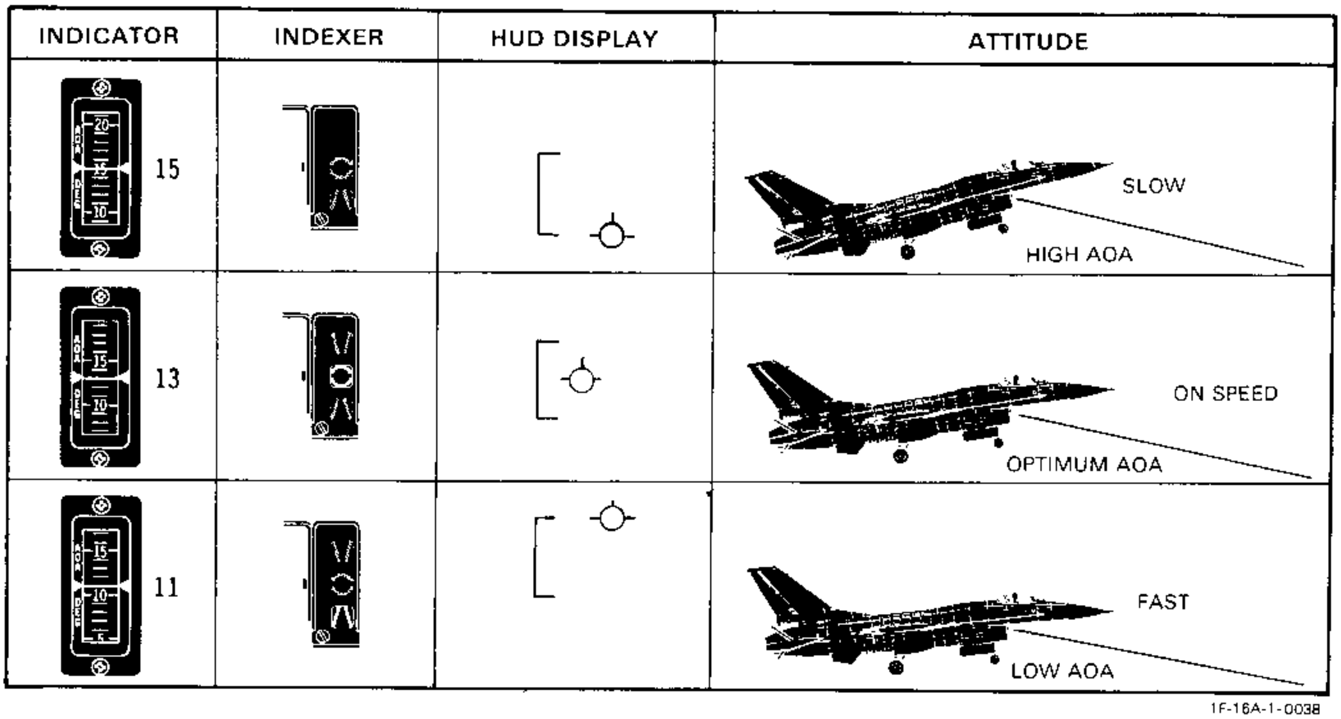


Figure 1-32.

HUD AOA Display

The HUD AOA bracket and flightpath marker (figure 1-32) provide a visual head-up indication of aircraft AOA. The flightpath marker aligned with the top of the bracket indicates 11 degrees AOA. The flightpath marker centered on the bracket indicates 13 degrees AOA. The flightpath marker aligned with the bottom of bracket indicates 15 degrees AOA.

AIR DATA SYSTEM

The air data system uses probes and sensors to obtain static and total air pressures, AOA, sideslip, and air temperature inputs. These air data parameters are processed and supplied to various systems. Refer to figure FO-13 for the air data system schematic.

Air Data Probes

Two air data probes provide data inputs to the air data system. One air data probe is mounted on the nose and provides a dual source of static and total pressure. The other air data probe is mounted on the forward right side of the fuselage and provides a source of static and total pressure.

AOA Transmitters

The AOA transmitters are conical airflow detectors. A transmitter is mounted on each side of the radome and each provides four signals to the ADC proportional to local AOA. The probe of the transmitter protrudes through the radome to align with the airstream. When the probes are fully rotated toward the front of the aircraft (ccw on the left, cw on the right), the bottom slot should point slightly aft of the 6 o'clock (straight down) position.

Total Temperature Probe

The total temperature probe provides the CADC with an analog signal which is required for true airspeed and air density computation. The probe is located on the left side of the engine nacelle air inlet.

Static Pressure Ports

Two flush-mounted static pressure ports used for measuring sideslip are located on the fuselage left and right sides aft of the forward equipment bay doors. These two ports provide inputs to a differential pressure sensor for angle-of-sideslip measurement. The measurement is also used to compensate the third AOA source error.

Probe Heat Switch

The nose air data probe, fuselage air data probe, the AOA transmitters, and the total temperature probe heaters are on anytime the aircraft is airborne, regardless of the switch position.

The probe heat switch (figure 1-6) is located on the test switch panel.

Functions are:

- PROBE HEAT – On the ground, this position energizes the nose air data probe, fuselage air data probe, and AOA transmitter heaters for functional testing and deicing. To test total temperature probe, the weight-on-MLG circuit breaker must be pulled.
- OFF – Circuit deenergized on the ground.

AIR DATA CONVERTER (ADC)

The ADC is an electropneumatic device comprised of two distinct sections: the PSA and ECA. The PSA contains sensors which convert pneumatic inputs from the nose air data probe and the fuselage air data probe pressure ports into electrical signals. The PSA supplies static and impact pressure signals and single AOA signals to the ECA.

The ECA converts signals from the PSA into four identical signals for each required parameter (AOA, static pressure, and impact pressure). The ratio of impact to static pressure is generated within the ECA and is used along with AOA and static pressure for LEF's scheduling. This pressure ratio, AOA, and impact pressure are supplied to the FLCC for gain scheduling.

Monitoring is provided in the ECA to detect single and dual malfunctions of the triplex sensor signals. A single malfunction in any of the sensor signals illuminates the ADC caution light. A dual malfunction of static or impact pressure or pressure ratio signals will result in the following:

- Illumination of the ADC, FLT CONT SYS, and LE FLAPS caution lights and the STBY GAINS light (on the FLCP).
- Activation of FLCS standby gains. Refer to STANDBY GAINS, this section.
- Loss of autopilot.

Nose probe tip icing will result in erroneously low airspeed indications, illumination of the ADC caution light, and flight control gains scheduled for low airspeed flight conditions.

ADC Caution Light

The ADC caution light illuminates whenever a single or dual failure occurs in the sensing of static and/or impact pressures or AOA. The light will also illuminate due to an error in impact/static pressure computation.

The ADC, LE FLAPS, and DUAL FC FAIL caution lights may illuminate for high AOA (above 29 degrees) and/or sideslip maneuvers. After recovery, reset and continue normal operations.

CENTRAL AIR DATA COMPUTER (CADC)

The CADC receives total and static pressure and total temperature inputs, converts the inputs into digital data, and then transmits the data to the using systems.

A CADC signal flow diagram showing the systems interacting with the CADC is shown in figure 1-33.

CADC Caution Light

The CADC caution light illuminates whenever a malfunction is detected. The EEC caution light will also illuminate if the malfunction affects the mach number signal.

WARNING, CAUTION, AND INDICATOR LIGHTS

Warning, caution, and indicator lights (figure FO-15) are used throughout the cockpit to call attention to a condition or to allow an item to be easily read. Red warning lights and the amber MASTER CAUTION light are all located on the edge of the glareshield. All of the lights, except the MASTER CAUTION light, are described under their respective systems.

CADC and Interfacing Systems

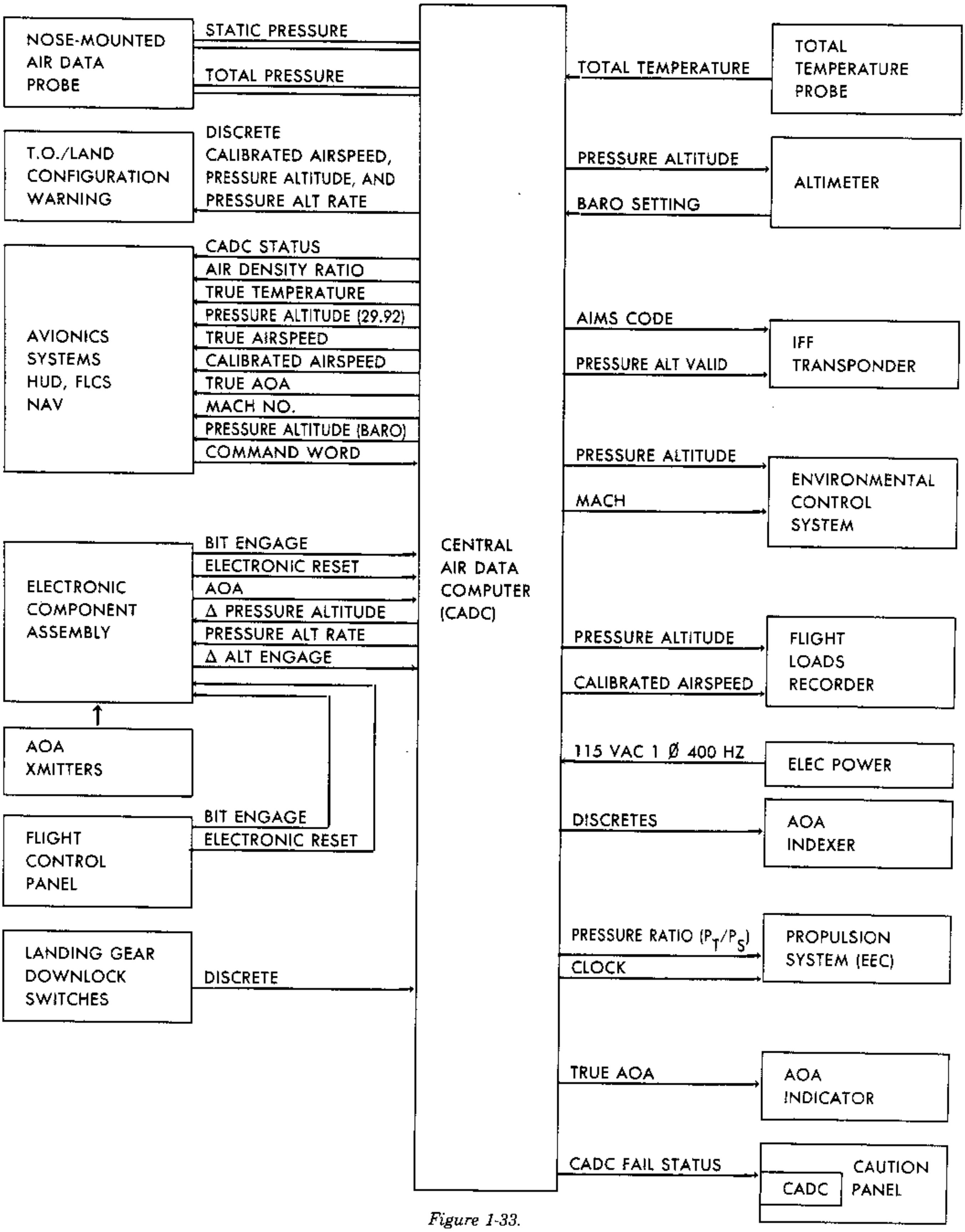


Figure 1-33.

The warning and caution lights (except MASTER CAUTION) are not press-to-test or press-to-reset lights. Pressing these lights will release them from their modules and deactivate them. To reengage a light that has been released, it must be pulled out slightly and then pressed to reengage the module.

VOICE WARNING/CAUTION SYSTEM (VWCS) 57

The VWCS provides a voice warning or caution message in the headset. The voice warning message (WARNING-WARNING pause WARNING-WARNING) is automatically activated after illumination of any warning light on the glareshield. The voice caution message (CAUTION-CAUTION) is automatically activated shortly after the illumination of any caution light (66 LESS 77 only if MAL & IND LTS switch, either [A], [BF], or [BR], is placed to BRT). If the MASTER CAUTION light is reset immediately after its illumination, the voice caution message will not occur. The fixed volume voice message will not blank other audio and, therefore, it may not be heard. The voice messages are reset for subsequent warning/caution messages by:

- Resetting the HUD WARN RESET for voice warning.
- Resetting the MASTER CAUTION for voice caution.
- Eliminating the condition that originally activated the lights and messages.

The voice warning message has priority over a caution message. Both voice messages have priority over the low speed warning signal (steady tone) and LG warning horn.

The VWCS does not function with WOW. However, it can be tested by pressing the MAL & IND LTS button on the test switch panel. The VWCS is powered by the battery bus.

MASTER CAUTION LIGHT

The MASTER CAUTION light (figure FO-15), located on the left upper edge of the glareshield, illuminates shortly after an individual light on the caution light panel to indicate a malfunction or specific condition exists. It does not illuminate in conjunction with the warning lights. The MASTER CAUTION light may be reset by depressing the face of the light unless it is illuminated by the FLT CONT SYS or ELEC SYS caution lights. The light should be reset as soon as feasible so that other caution lights can be monitored should additional malfunctions or specific conditions occur. Unless it is reset, the MASTER CAUTION light will remain illuminated as long as the individual caution light is illuminated. 66 LESS 77 If the MAL & IND LTS switch(es) ([A] and both [BF] and [BR]) is placed to DIM, the MASTER CAUTION light may not be resettable. The light can be checked by depressing the MAL & IND LTS button on the test switch panel. [BR] The MASTER CAUTION light is a repeater and cannot be reset individually.

CAUTION LIGHT PANEL

The caution light panel (figure FO-15) is located on the forward portion of the right console. The following two lights must be reset at the respective system control panels:

- FLT CONT SYS – FLCP, FCS CAUTION RESET button.
- ELEC SYS – Electrical control panel, ELEC CAUTION RESET button.

  Exception: Certain aircraft battery charging system or FLCS battery system failures can result in a nonresettable ELEC SYS caution light. The light may appear nonresettable in situations where the ELEC SYS light is rapidly flashing or cycling on and off.

The following lights may be reset at the system control panels:

- AVIONICS – FCNP, FALT ACK button.
- LE FLAPS, ADC, CADC – FLCP, SERVO ELEC RESET switch (ELEC position).

Malfunction and Indicator Lights Test Button

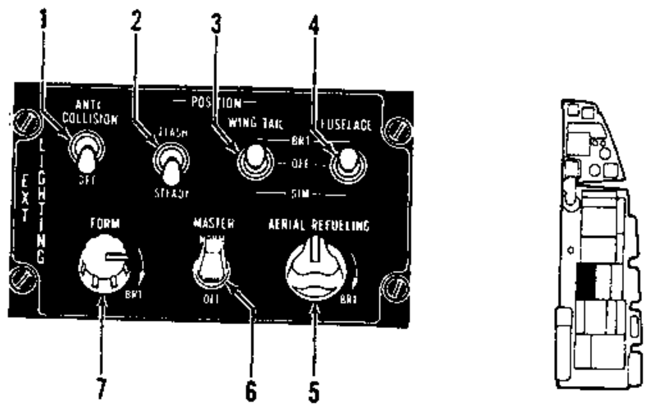
The MAL & IND LTS test button (figure 1-6) is located on the test switch panel. The button operates relays which test the illumination of all warning and caution lights (except the FLCP servo and dot lights), 57 voice warning and caution messages, and 44 ECM pod control panel lights.

LIGHTING SYSTEM

EXTERIOR LIGHTING

All of the exterior lights (figure 1-35) except the landing/taxi lights and [DE] [NO] [A] identification light are controlled from the exterior lighting control panel (figure 1-34).

Exterior Lighting Control Panel A BF (Typical)



1. ANTICOLLISION Switch
2. FLASH STEADY Switch
3. WING TAIL Switch
4. FUSELAGE Switch
5. AERIAL REFUELING Knob
6. MASTER Switch
7. Formation (FORM) Knob

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Figure 1-34.

EXTERIOR LIGHTING CONTROL PANEL CONTROLS (Refer to figure 1-34)

CONTROL	POSITION	FUNCTION
1. ANTICOLLISION Switch	ANTICOLLISION	Turns on the white anticollision strobe (flash) light on top of vertical tail
	OFF	Turns off the anticollision light
2. FLASH STEADY Switch	FLASH	Causes the lights controlled by WING TAIL switch to flash when turned on
	STEADY	Causes the lights controlled by WING TAIL switch to light steady when turned on

EXTERIOR LIGHTING CONTROL PANEL CONTROLS – Continued

CONTROL	POSITION	FUNCTION
3. WING TAIL Switch	BRT	Turns on the red and green wingtip and inlet lights and white light at trailing edge of vertical tail bright
	OFF	Turns off the white light at trailing edge of vertical tail and the inlet lights. Allows the red and green wingtip lights to be controlled by the FORM knob
	DIM	Turns on the red and green wingtip lights Block 10 bright and Block 15 dim. Turns on the red and green inlet lights and the white light at the trailing edge of the vertical tail dim
4. FUSELAGE Switch	BRT	Turns on the white floodlights at the base of the vertical tail bright LESS 83 and Block 15 the white vertical tail-mounted floodlight bright
	OFF	Turns off the white floodlights LESS 83 and Block 15 the white vertical tail-mounted floodlight (AR door closed)
	DIM	Turns on the white floodlights dim LESS 83 and Block 15 the white vertical tail-mounted floodlight dim (AR door closed)
5. AERIAL REFUELING Knob	Variable from off to BRT	Varies the LESS 39 white AR floodlight or 39 AR slipway lights from off to bright if AIR REFUEL switch is in OPEN
6. MASTER Switch	NORM	Enables all exterior lights except landing/taxi and DE NO A ID lights
	OFF	Disables all exterior lights except landing/taxi and DE NO A ID lights
7. FORM Knob	Variable from off to BRT	Varies the white formation lights on top and bottom of fuselage and, when the WING TAIL switch is OFF, varies the red and green wingtip lights from off to bright

Anticollision Light

The anticollision light is masked to minimize projections in the cockpit.

Position/Formation Lights

Refer to figure 1-35.

Air Refueling Lights

The AR floodlight shares the housing of the top fuselage formation light. The light is directed aft to flood the receptacle, fuselage, wing, and empennage. The AR slipway contains embedded lights on each side of the slipway. These lights are enabled when the AIR REFUEL switch is in OPEN.

Vertical Tail-Mounted Floodlight Block 15

A white light is mounted on the upper leading edge of the vertical tail and is directed forward to flood the AR receptacle and upper fuselage. The light illuminates by the OPEN position of the AIR REFUEL switch **LESS** 83 or by the FUSELAGE light switch on the exterior lighting control panel.

Landing and Taxi Light

A white landing light is located in the left wheel well. The light is angled to illuminate the landing area. A white taxi light is located in the right wheel well. The lights are turned on by the three-position LANDING TAXI LIGHTS toggle switch (figure 1-20) located on the LG control panel. The switch has positions of LANDING, OFF, and TAXI. The light will go off during LG retraction if the switch is left in either the LANDING or TAXI position.

Identification (ID) Light DE NO A

A white, flush-mounted, target ID light is installed in the left forward equipment bay door. The beam points 70 degrees left of forward and 10 degrees above the aircraft horizontal centerline plane.

Exterior Lighting (Typical)

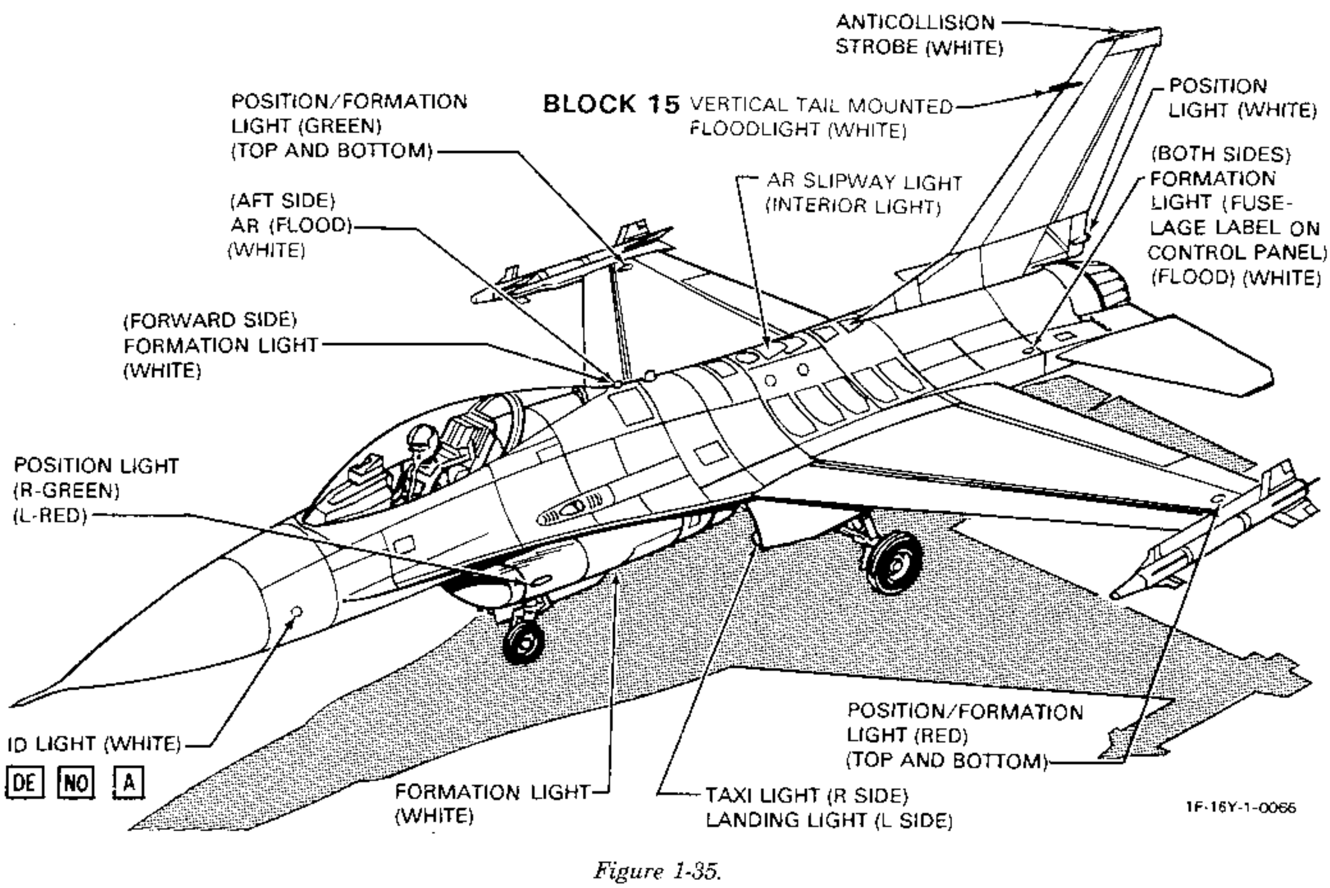


Figure 1-35.

The light is turned on by the TAXI position of the LANDING TAXI LIGHTS switch after LG is retracted.

INTERIOR LIGHTING

The interior lighting control panel (figure 1-36) contains the power and intensity controls for the primary (console and instrument) and secondary (flood) lighting systems for the cockpit. The high intensity position of the FLOOD CONSOLES knob provides thunderstorm lighting.

PRIMARY CONSOLES Knob

The PRIMARY CONSOLES knob has a cw arrow pointing toward BRT. Rotating the knob cw varies the intensity of the primary and auxiliary console lighting from dim to bright.

PRIMARY INST PNL Knob

The PRIMARY INST PNL knob has a cw arrow pointing toward BRT. Rotating the knob cw varies the intensity of the forward instrument panel lighting from off to bright.

NAV/FREQ DISP Knob

The NAV/FREQ DISP knob has a cw arrow pointing toward BRT. The knob controls the lighting of the FCNP and RCFI from off to bright.

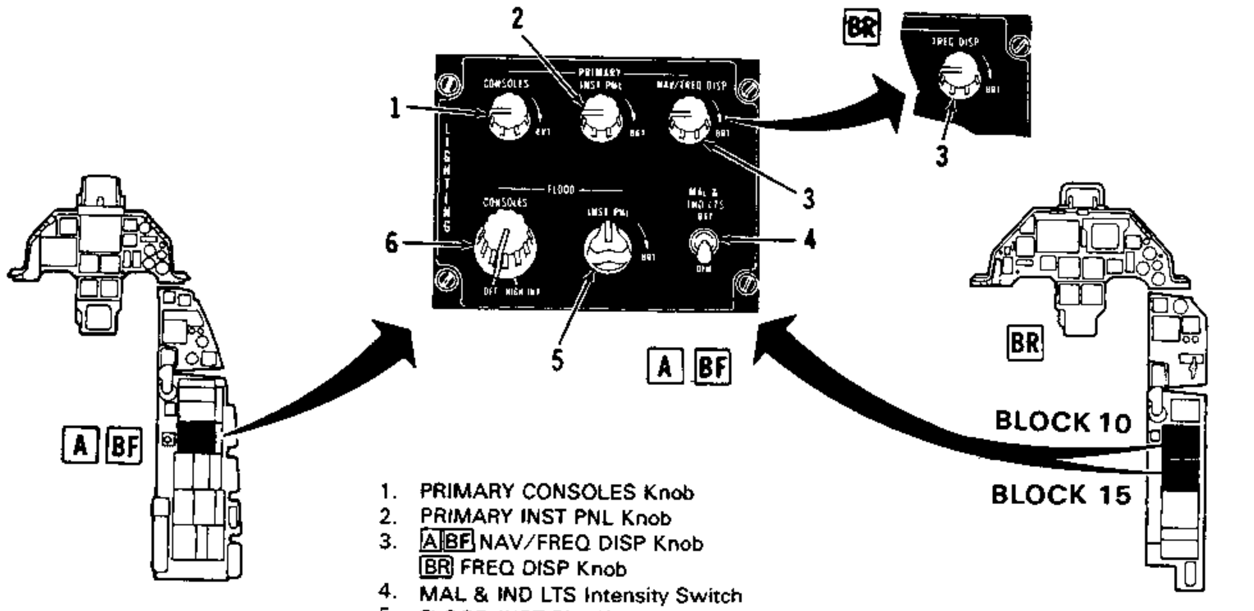
MAL & IND LTS Switch

The MAL & IND LTS switch has positions of BRT and DIM and a spring-loaded unmarked center position. If the PRIMARY INST PNL knob is on, momentary actuation of the switch to DIM will place the lighting system to the dim condition. The system will automatically return to the BRT condition if the FLOOD CONSOLES knob is turned past the detent to HIGH INT, the PRIMARY INST PNL knob is turned off, or if nonessential ac power is lost. The BRT condition can be manually selected anytime. The switch controls the light intensity of all the warning, caution, and indicator lights except the following:

Cannot be dimmed:

- **LESS** 44 ECM pod control panel
- FLCP fault lights

Interior Lighting Control Panel (Typical)



1. PRIMARY CONSOLES Knob
2. PRIMARY INST PNL Knob
3. A BF NAV/FREQ DISP Knob
   BR FREQ DISP Knob
4. MAL & IND LTS Intensity Switch
5. FLOOD INST PNL Knob
6. FLOOD CONSOLES Knob

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Figure 1-36.

Individually dimmed:

- AOA indexer
- AR/NWS indexer
- SCP
- TWS indicators
- IFF control panel REPLY and TEST lights
- FCNP and RCFI display
- 44 ECM pod control panel

FLOOD INST PNL Knob

The FLOOD INST PNL knob has a cw arrow pointing toward BRT. Rotating the knob cw varies the floodlight from off to bright.

FLOOD CONSOLES Knob

The FLOOD CONSOLES knob rotates from OFF to HIGH INT. Rotating the knob cw varies the console floodlights from off to bright. If rotated to HIGH INT, the MAL & IND LTS will automatically go to bright and the alphanumeric displays controlled by the NAV/FREQ control knob will go to their highest intensity. CCW rotation past a certain point will restore the alphanumeric displays to the level set by the NAV/FREQ control knob, but the MAL & IND LTS switch must be manually reset to DIM, if dim is desired.

Utility Light

The utility light (figure 1-37) is located outboard of the right console and includes two controls: a pushbutton to allow momentary operation and a rotary control knob to allow continuous operation at any desired level of illumination. Power is provided by the battery bus. To release the light from its stowed position, lower the knurled collar at the base of the light and it will pop free. The light can be locked back into position by placing the body of the light parallel to the sidewall fairing and pushing down firmly on the light assembly.

Cockpit Spotlights

The cockpit spotlights (figure 1-37) are located under the upper left and right glareshields. In the stowed position (horizontal, facing forward), the spotlight is off.

Utility Light and Spotlights (Typical)

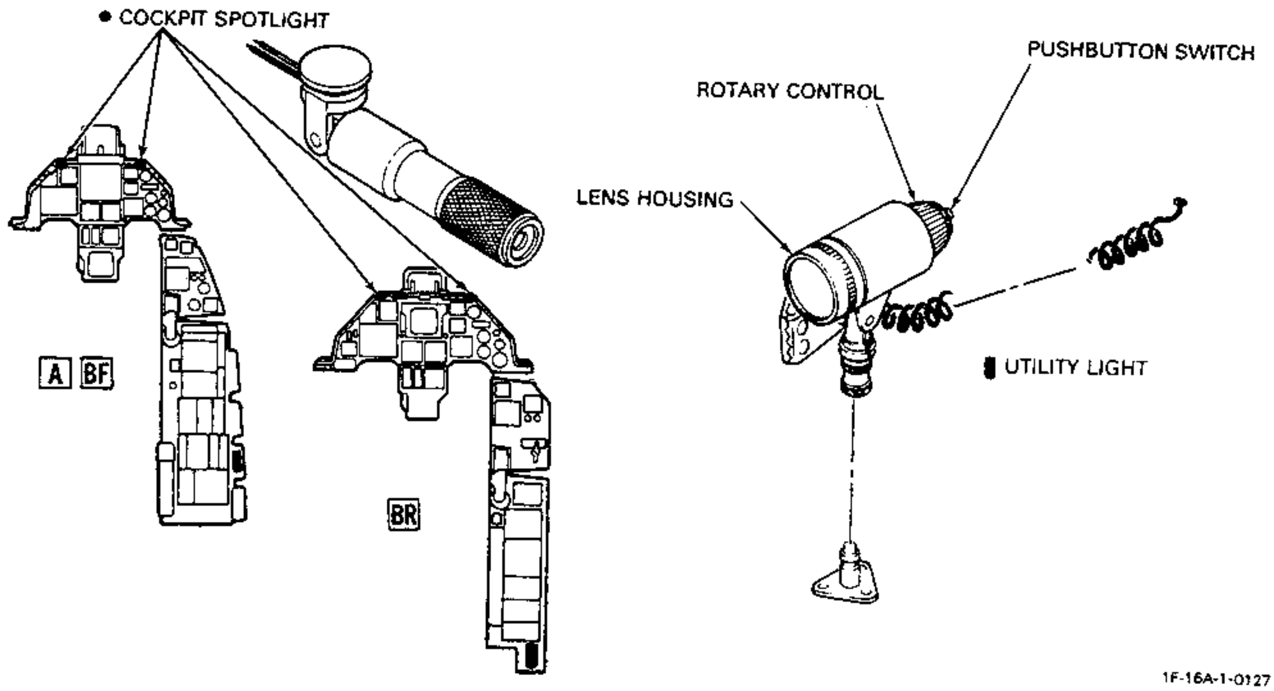


Figure 1-37.

The spotlight is turned on by pulling the spotlight barrel downward. Illumination intensity is controlled by turning the knurled barrel (dimmer). To turn the spotlight off, return it to the stowed position. Overrotation of the knurled barrel may cause breakage of the bulb or rheostat. Power is supplied through the battery bus.

ESCAPE SYSTEM

CANOPY

The canopy is a two-piece, plastic, bubble-type, transparent enclosure. The forward part is a single-piece windshield-canopy transparency, which is hinged at the aft end and is unlatched, opened, or closed/latched by an electrically operated actuator with a manual backup. [A] A smaller fixed transparency fairs to the fuselage aft of the seat. The canopy may be jettisoned by internal controls for in-flight or ground escape and by external controls for ground rescue. An inflatable pressurization seal on the cockpit sill mates with the edge of the movable canopy. A noninflatable rubber seal on the canopy prevents the entry of water when the cockpit is not pressurized. The canopy provides bird strike protection and has successfully withstood test strikes of 4-pound birds at 350 knots. Bird strikes of this magnitude on centerline at approximately eye level typically produce enough canopy deflection to shatter the HUD combiner glass and cause rearward propagation of a deflection wave. Deflection of the canopy in the area of the pilot's helmet has been observed to be approximately 3/4 to 1-1/4 inches. Impacts off center may not shatter the HUD glass. Higher energy bird strikes may cause canopy penetration or larger deflection waves.

Canopy Controls/Indicators

Refer to figure 1-38.

Canopy Handcrank

A handcrank (figure 1-38) manually performs the same function as the canopy switch. Due to the strength required to open the canopy with the handcrank, the method should be considered a last resort.

An external flush-mounted handcrank receptacle just opposite the inside manual drive is used for ground crew manual operation of the canopy.

Canopy Handle [A] [BF]

The canopy handle (figure 1-38), located on the canopy sill just forward of the throttle, hinges down to cover and protect the internal canopy switch. The handle also functions to inflate/deflate the canopy pressure seal, to turn the CANOPY warning light off/on, and to mechanically prevent the canopy actuator from unlatching. The canopy handle should be in the up (unlock) position prior to lowering the canopy.

The FLCS batteries are disconnected from the FLCS inverters when the canopy 56 is partially opened or **LESS** 56 when the canopy is unlocked.

CANOPY JETTISON

Depressing the button on either side of the CANOPY JETTISON T-handle (figure 1-38) and pulling upward initiate the canopy jettison sequence independent of seat ejection. Pulling the external canopy jettison D-handle on either the left or right side of the fuselage initiates the canopy jettison sequence independent of seat ejection. Pulling the ejection handle D-ring initiates the canopy and seat ejection sequence.

EJECTION SEAT

The ACES II ejection seat (figure 1-39) operates in one of three automatic airspeed/altitude modes. Refer to figure 3-4.

Ejection Handle

The ejection handle (figure 1-39) is sized for single- or dual-handed operation and requires a pull of 40-50 pounds to activate.

SHOULDER HARNESS Knob

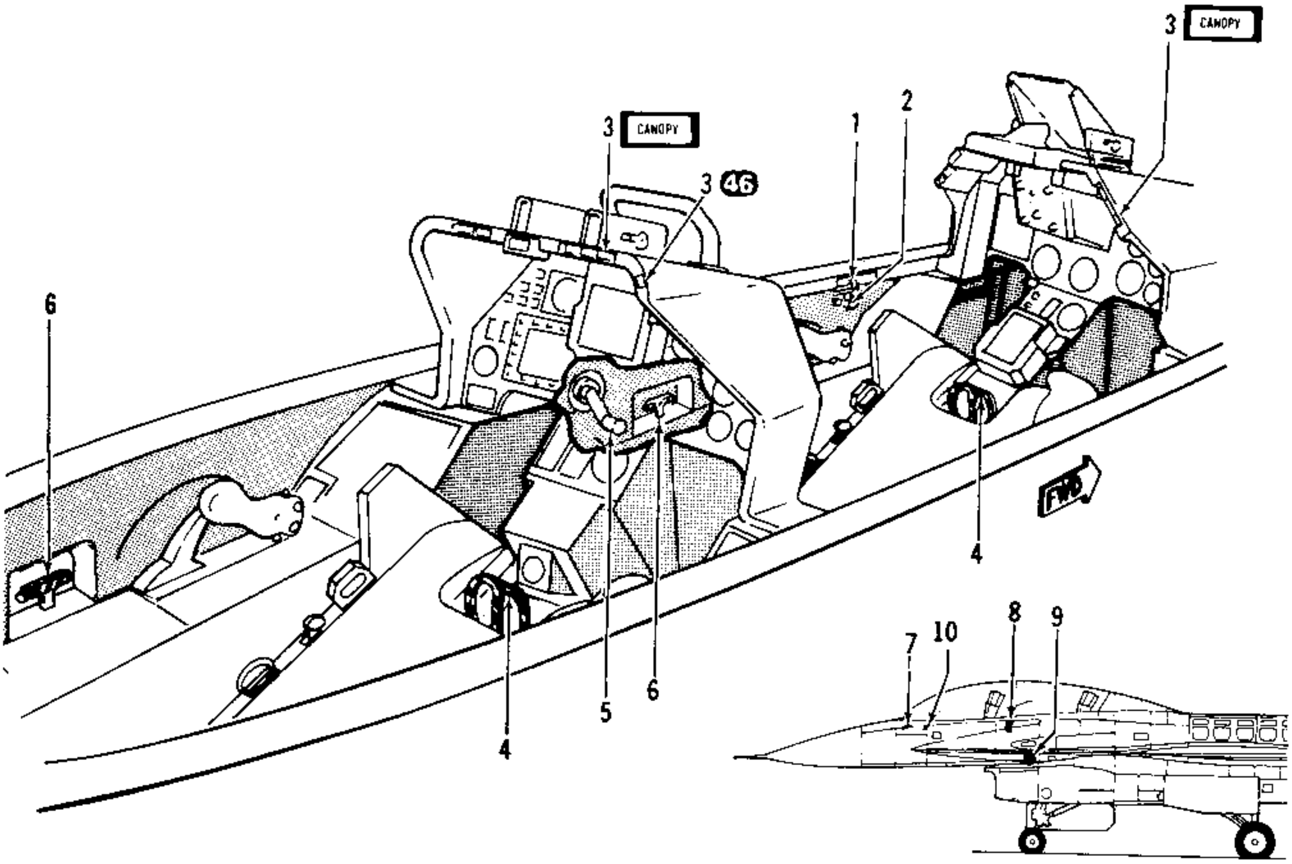
The SHOULDER HARNESS knob (figure 1-39) unlocks the inertia reel in the aft position and locks it in the forward position. If high longitudinal deceleration force or high strap playout velocities are encountered, the inertia reel will automatically lock.

RESTRAINT EMERGENCY RELEASE Handle

The RESTRAINT EMERGENCY RELEASE handle (figure 1-39) manually overrides the seat/man separation system if it fails after ejection. Pulling up on the handle releases the lapbelt and the inertia reel.

Canopy Controls and Indicators (Typical)

NOTE:
If the internal canopy switch is in the up position, the canopy cannot be closed, latched or locked down using the external canopy switch.



1. Canopy Handle [A] [BF]
2. Canopy Switch (Internal) [A] [BF] (Spring loaded to center from down position)
3. CANOPY Warning Light
4. Ejection Handle (PULL TO EJECT)
5. CANOPY Hand Crank [A] [BF]
6. CANOPY JETTISON T-Handle
7. Canopy Jettison D-Handle (Each Side of Fuselage)
8. CANOPY Hand Crank Receptacle (External)
9. Canopy Switch (External) (Spring Loaded to Center)
10. Canopy Lock Access Plug (External)

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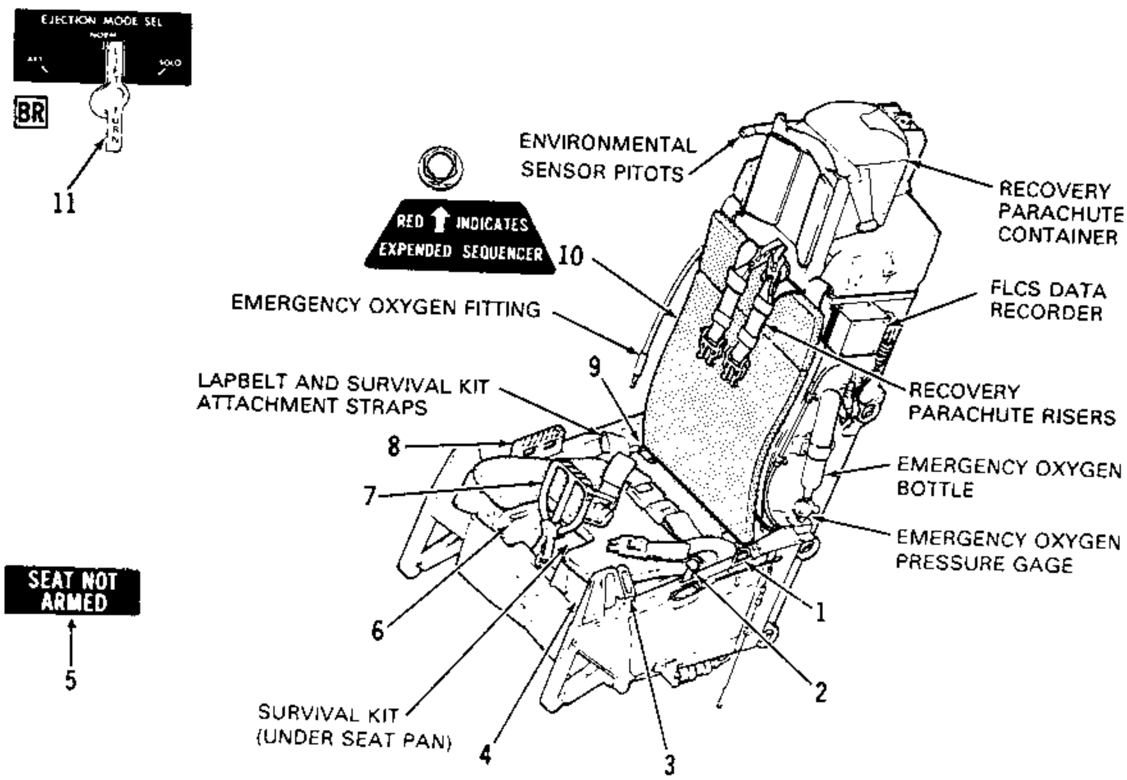
Figure 1-38.

CANOPY CONTROLS AND INDICATORS (Refer to figure 1-38)

CONTROL/INDICATOR	POSITION/INDICATION	FUNCTION
1. Canopy Handle [A] [BF]	Up	Unlocks canopy
	Down	Locks canopy
2. Canopy Switch (internal) [A] [BF] (spring-loaded to center from down position)	Up	Opens canopy
	Center	Stops canopy motion
	Down	Closes and latches canopy
3. CANOPY Warning Light	Off	Canopy locked
	On	Canopy unlocked
4. Ejection Handle (PULL TO EJECT)	Pull	Jettisons canopy and ejects seat
5. CANOPY Handcrank [A] [BF]	Rotate ccw	Opens canopy
	Rotate cw	Closes and latches canopy
6. CANOPY JETTISON T-Handle	Pull (depress either button)	Jettisons canopy independent of seat ejection
7. Canopy Jettison D-Handle (each side of fuselage)	Pull (approx 6 ft) (either handle)	Jettison canopy independent of seat ejection
8. CANOPY Handcrank Receptacle (external)	Rotate cw	Opens canopy
	Rotate ccw	Closes and latches canopy
9. Canopy Switch (external) (spring-loaded to center position)	[A] UP [B] Aft	Opens canopy
	Center	Stops canopy motion
	[A] Down [B] Fwd	Closes and latches canopy
10. Canopy Lock Access Plug (external)	(Remove plug)	Access to unlock internal canopy handle. Refer to EMERGENCY ENTRANCE AND CREW RESCUE, Section III

Ejection Seat Controls and Indicators (Typical)



1. Emergency Oxygen Ring
2. SHOULDER HARNESS Knob
3. Ejection Safety Lever
4. RADIO BEACON Switch
5. SEAT NOT ARMED Caution Light
6. Survival KIT DEPLOYMENT Switch
7. Ejection Handle (PULL TO EJECT)
8. RESTRAINT EMERGENCY RELEASE Handle
9. Survival Kit Ripcord
10. Electronic Recovery Sequencer Indicator
11. EJECTION MODE SEL Handle BR

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Figure 1-39.

EJECTION SEAT CONTROLS AND INDICATORS (Refer to figure 1-39)

CONTROL/INDICATOR	POSITION/INDICATION	FUNCTION
1. Emergency Oxygen Ring	Pull	Activates emergency oxygen
2. SHOULDER HARNESS Knob	UNLOCKED	Unlocks inertia reel and allows free movement of shoulder harness
	LOCKED	Locks inertia reel and prevents forward movement of shoulder harness
3. Ejection Safety Lever	Up	Safes seat ejection initiators
	Down	Arms seat ejection initiators
4. RADIO BEACON Switch	MAN	Selects manual mode
	AUTO	Selects automatic mode
5. SEAT NOT ARMED Caution Light	On	Ejection safety lever up
	Off	Ejection safety lever down
6. Survival KIT DEPLOYMENT Switch	A (Forward)	Selects automatic mode
	M (Aft)	Selects manual mode
7. Ejection Handle (PULL TO EJECT)	Pull	Jettisons canopy and ejects seat
8. RESTRAINT EMERGENCY RELEASE Handle	Pull	Ground egress – releases lapbelt
		After ejection – overrides automatic man/seat separation
9. Survival Kit Ripcord	Pull	Deploys survival kit
10. Electronic Recovery Sequencer Indicator	White	Sequencer thermal batteries not activated – operational
	Red	Sequencer thermal batteries activated – not operational
11. EJECTION MODE SEL Handle BR	AFT/NORM/SOLO	Selects ejection mode

A mechanical interlock prevents release from either the parachute risers or the survival kit straps.

Ejection Safety Lever

The ejection safety lever (figure 1-39) mechanically safeties the seat ejection handle. The seat is safetied with the lever in the up (vertical) position and is armed in the down (horizontal) position. Movement to the down position turns off the SEAT NOT ARMED caution light.

Height Adjustment Switch

The height adjustment switch is located on the right cockpit sidewall outboard of the stick. Center position is spring-loaded off. The up position raises the seat, while down lowers the seat.

Drogue Chute/Recovery Parachute

The drogue chute (figure 1-39), located on the seat back, stabilizes the seat during mode 2 or 3 ejection. During high speed ejection, the drogue chute decelerates the seat to an airspeed low enough for tolerable recovery parachute opening. The recovery parachute is sealed in the headrest.

Shoulder Harness Straps

The upper torso restraints consist of shoulder harness straps which also act as parachute risers. The inertia reel straps are attached to the parachute risers and may be manually released by pulling the RESTRAINT EMERGENCY RELEASE handle.

Lapbelt

The lower torso restraints consist of a lapbelt and survival kit straps. The lapbelt may be released by pulling the RESTRAINT EMERGENCY RELEASE handle.

Survival Kit

The survival kit is stowed under the seat pan. The deployment switch (figure 1-39) has a manual (aft) or automatic (forward) mode of post-ejection survival kit deployment. Pulling the ripcord deploys the survival kit which remains attached by a lanyard.

RADIO BEACON Switch US BE DE NE

The RADIO BEACON switch (figure 1-39) allows the occupant to select MAN or AUTO. In AUTO, the beacon activates with seat/man separation, transmitting on 243.0 mHz. In MAN mode, the beacon will not activate. The beacon may be turned on when on the ground and the beacon switch is placed to ON.

Emergency Oxygen

Emergency oxygen supply (figure 1-39) is automatically actuated during ejection or may be manually activated by pulling the green ring.

EJECTION SEAT OPERATION

Seat ejection is initiated by pulling the ejection handle. This retracts the shoulder harness and locks the inertia reel, fires initiators for canopy jettison, and ignites two canopy removal rockets. As the canopy leaves the aircraft, lanyards fire two seat ejection initiators.

A rocket catapult propels the seat from the cockpit, the seat environmental sensor pitots (figure 1-39) are exposed, and the emergency oxygen is actuated. The recovery sequencer selects the correct recovery mode, ignites the stabilization package (STAPAC) and the trajectory divergence rocket, and (if in mode 2 or 3) initiates the drogue gun. Refer to figure 1-40 and EJECTION SEQUENCE TIMES, this section.

If the recovery system fails, pulling the RESTRAINT EMERGENCY RELEASE handle releases the lapbelt and inertia reel harness, frees the parachute assembly, and releases the pilot chute. The handle does not release the parachute risers or survival kit straps, either after ejection or for ground egress. The life raft, survival kit, and radio beacon are deployed following seat/man separation when in AUTO. Figure 1-41 contains low level seat performance information.

Ejection Sequence Times

NOTE

- In mode 3, events after drogue release are delayed until within mode 2 envelope. Recovery parachute deploys after 1-second delay.
- [B] Times in the aft/forward sequence increase to include a 0.4-second delay for the rear seat and a 0.8-second delay for the forward seat. In SOLO, the forward seat is delayed 0.4 second.
- Canopy jettison time (figure 1-42) varies from 0.75 second at 0 KIAS to 0.13 second at 600 KIAS. Ejection begins when canopy jettison initiates seat lanyard.

EVENT	TIME (SECONDS) Mode 1	Mode 2
1. Catapult Initiation	0.0	0.0
2. Drogue Gun Fired	NA	0.16
3. Drogue Chute Inflated	NA	0.38
4. Parachute Fired	0.20	1.17
5. Seat/Drogue Separation	NA	1.32
6. Seat/Man Separation	0.45	1.42
7. Recovery Parachute Inflated	1.80	2.90
8. Survival Kit Deployed	5.80	6.90

Figure 1-40.

Low Level Seat Performance – Sea Level

ATTITUDE PITCH	ROLL	VELOCITY (KIAS)	ALTITUDE REQUIRED (FEET AGL) [A]	[B]
LEVEL	LEVEL	0	0	0
LEVEL	60°	120	7	7
LEVEL	180°	150	272	272
LEVEL, 10,000 FPM SINK RATE	0°	150	321	407

ATTITUDE PITCH	ROLL	VELOCITY (KIAS)	ALTITUDE REQUIRED (FEET AGL) [A]	[B]
60° DIVE	0°	200	683	833
30° DIVE	0°	450	717	912
60° DIVE	60°	200	744	894
45° DIVE	180°	250	872	1026

Figure 1-41.

Canopy Jettison/Seat Ejection

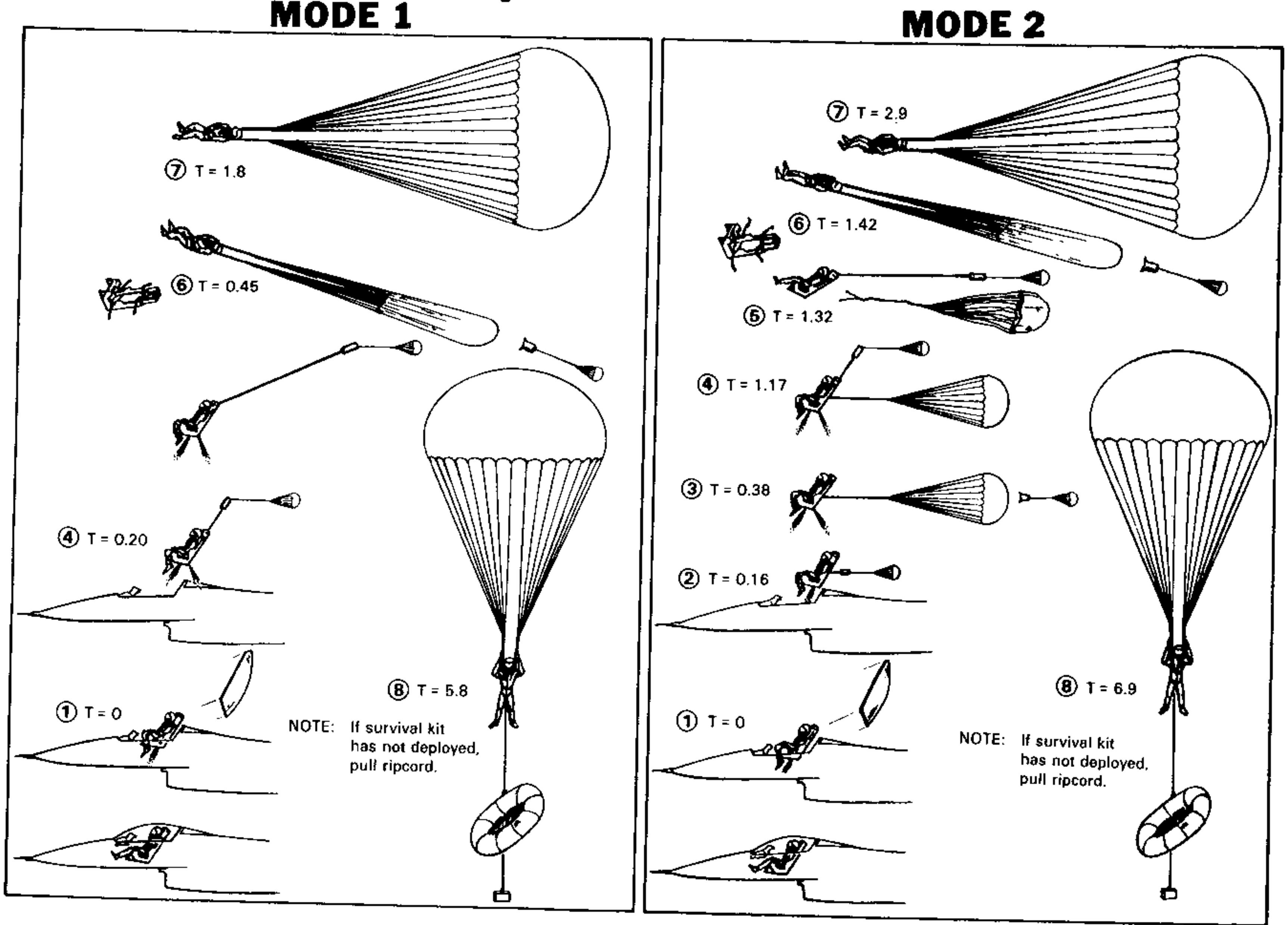


Figure 1-42.

OXYGEN SYSTEM

The oxygen system consists of a liquid system and an emergency gaseous system. For a schematic of the system, refer to figure 1-44.

LIQUID OXYGEN SYSTEM

A 5-liter liquid oxygen system (figure 1-44) provides breathing oxygen to a pressure demand oxygen regulator. The regulator provides for selection of normal diluted oxygen and 100 percent oxygen. Quick-disconnects are located between the mask and the aircraft oxygen system to expedite egressing the aircraft on the ground. Oxygen duration varies depending upon altitude, regulator settings, and usage. For oxygen duration, refer to figure 1-45.

Oxygen System Controls/Indicators

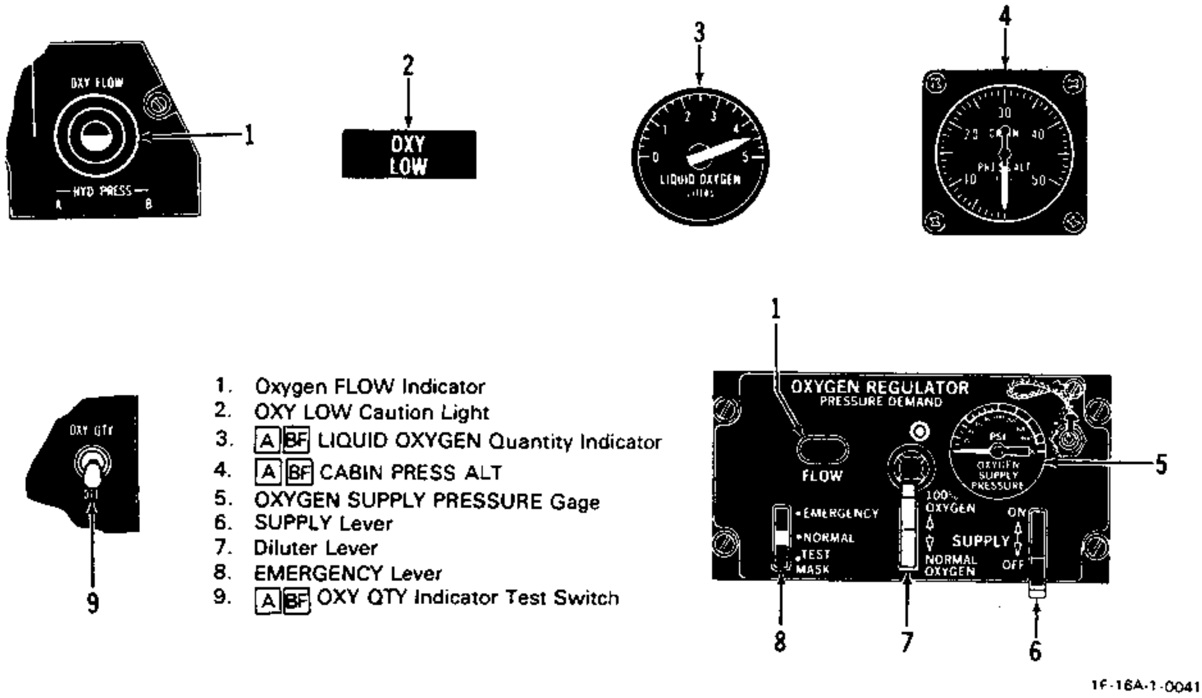
Oxygen system controls and indicators are shown and described in figure 1-43.

EMERGENCY OXYGEN SYSTEM

The emergency oxygen system (figure 1-39) consists of a high-pressure bottle and a pressure regulator mounted on the left side of the ejection seat. The hose is routed to the right side of the seat. The system is activated:

- Automatically upon ejection.
- Manually by a green ring (figure 1-39) located on the aft left side of the seat.

Oxygen System Controls/Indicators (Typical)



1. Oxygen FLOW Indicator
2. OXY LOW Caution Light
3. A BF LIQUID OXYGEN Quantity Indicator
4. A BF CABIN PRESS ALT
5. OXYGEN SUPPLY PRESSURE Gage
6. SUPPLY Lever
7. Diluter Lever
8. EMERGENCY Lever
9. A BF OXY QTY Indicator Test Switch

Figure 1-43.

OXYGEN SYSTEM CONTROLS/INDICATORS (Refer to figure 1-43)

CONTROL/INDICATOR	POSITION/INDICATION	FUNCTION
1. Oxygen FLOW Indicator	White	Indicates oxygen flow
	Black	Indicates no oxygen flow
2. OXY LOW Caution Light	On	Indicates oxygen quantity is less than 0.5 liter or system pressure below safe level
3. LIQUID OXYGEN Quantity Indicator	0-5 liters	Indicates quantity of liquid oxygen remaining in converter reservoir
4. CABIN PRESS ALT	0-50,000 feet	Indicates cockpit pressure altitude
5. OXYGEN SUPPLY PRESSURE Gage	Oxygen pressure (psi)	Indicates gaseous oxygen pressure at regulator in psi
6. SUPPLY Lever	ON	Turns on oxygen supply to mask
	OFF	Turns off oxygen supply to mask
7. Diluter Lever	NORMAL OXYGEN	Provides regulated mixture of cockpit air and oxygen to mask as determined by cockpit pressure altitude
	100% OXYGEN	Provides regulated 100 percent oxygen to mask
8. EMERGENCY Lever	NORMAL	Provides oxygen proportionally diluted with air up to 35,000 feet cockpit pressure altitude. Above 35,000 feet, positive pressure breathing is provided
	EMERGENCY	Provides 100 percent oxygen under positive pressure to the mask
	TEST MASK	Provides positive pressure to test mask and hose for leaks
9. OXY QTY Indicator Test Switch	OXY QTY	Pointer drives ccw toward 0. As pointer passes 0.5 liter, OXY LOW caution light comes on. Light goes out when switch is released as pointer passes 0.5 liter
	OFF (spring-loaded)	Normal position

Oxygen System Schematic (Typical)

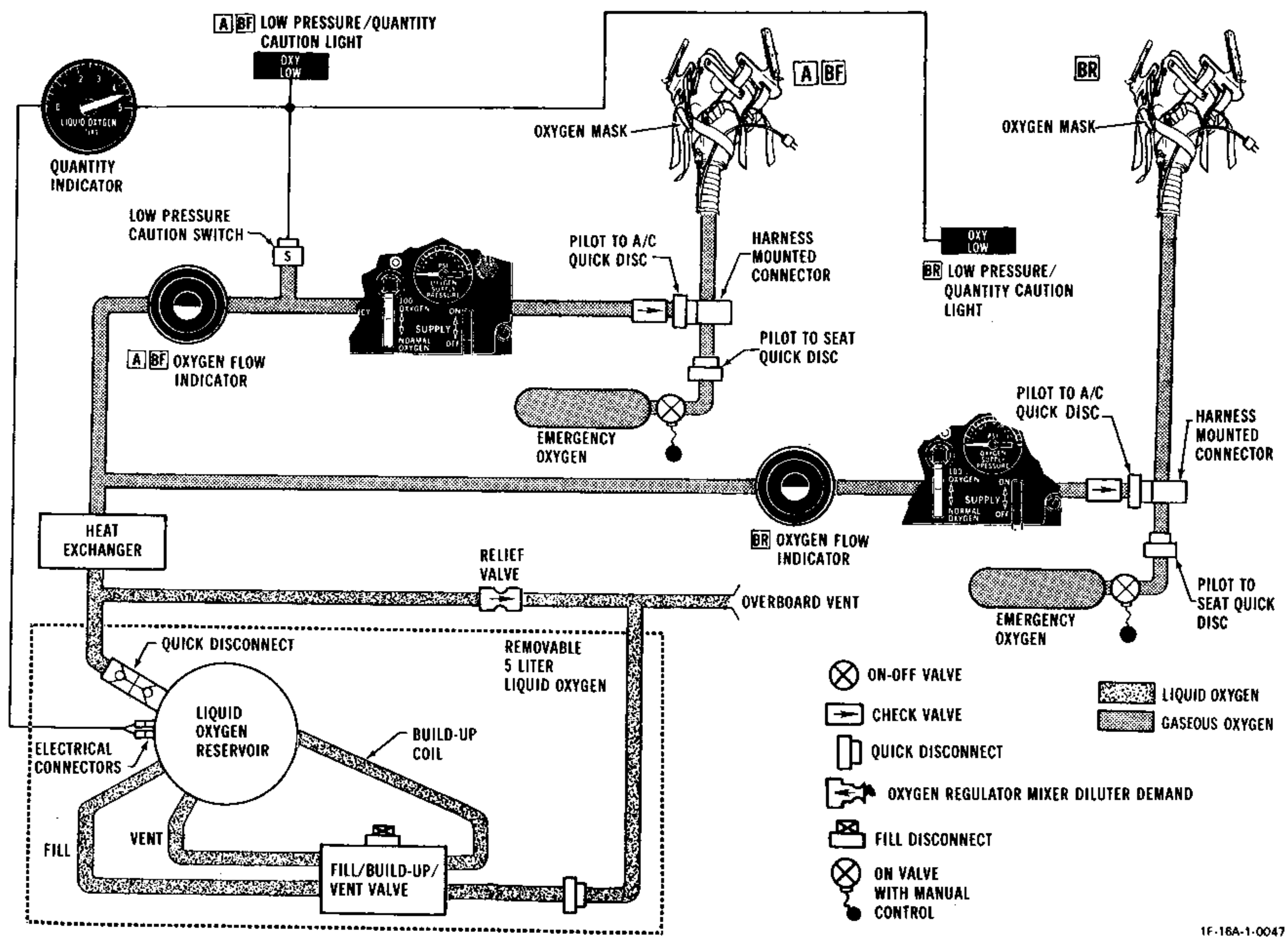


Figure 1-44.

Oxygen Duration

	COCKPIT PRESSURE ALTITUDE (FEET)	DILUTER LEVER (POSITION)	OXYGEN DURATION (HOURS) GAGE QUANTITY (LITERS) 5	4	3	2	1
A	35,000 AND UP	100%	30.94	24.75	18.56	12.37	6.19
A	35,000 AND UP	NORMAL	30.94	24.75	18.56	12.37	6.19
A	30,000	100%	22.63	18.11	13.58	9.05	4.53
A	30,000	NORMAL	23.00	18.40	13.80	9.20	4.60
A	25,000	100%	17.48	13.98	10.49	6.99	3.50
A	25,000	NORMAL	21.72	17.37	13.03	8.69	4.34
A	20,000	100%	13.19	10.55	7.91	5.28	2.64
A	20,000	NORMAL	24.43	19.55	14.66	9.77	4.89
A	15,000	100%	10.62	8.49	6.37	4.25	2.12
A	15,000	NORMAL	29.86	23.89	17.92	11.94	5.97
A	10,000	100%	8.53	6.83	5.12	3.41	1.71
A	10,000	NORMAL	29.86	23.89	17.92	11.94	5.97
B	35,000 AND UP	100%	15.47	12.37	9.28	6.18	3.09
B	35,000 AND UP	NORMAL	15.47	12.37	9.28	6.18	3.09
B	30,000	100%	11.31	9.05	6.79	4.52	2.26
B	30,000	NORMAL	11.50	9.20	6.90	4.60	2.30
B	25,000	100%	8.74	6.99	5.24	3.49	1.75
B	25,000	NORMAL	10.86	8.68	6.51	4.39	2.17
B	20,000	100%	6.59	5.27	3.95	2.64	1.32
B	20,000	NORMAL	12.21	9.77	7.33	4.88	2.44
B	15,000	100%	5.31	4.24	3.18	2.12	1.06
B	15,000	NORMAL	14.93	11.94	8.96	5.97	2.98
B	10,000	100%	4.26	3.41	2.56	1.70	0.85
B	10,000	NORMAL	14.93	11.94	8.96	5.97	2.98

NOTES:

1. B When solo, refer to A
2. Oxygen duration increases as cockpit pressure altitude increases because there is less ambient pressure acting upon the lungs. Therefore, a smaller quantity of oxygen at altitude will expand the lungs to the same size that they were at sea level

Figure 1-45.

COMMUNICATIONS SYSTEM

The aircraft communications system consists of a HAVE QUICK UHF or standard UHF radio (figure 1-47), a VHF radio (figure 1-49), a radio channel/frequency indicator (RCFI) (figure 1-50), an intercom set (figure 1-51), and provisions for a secure voice system (figure 1-52). Antenna locations are shown in figure 1-46.

STANDARD UHF RADIO

The UHF radio provides line-of-sight communications. The UHF radio control panel (figure 1-47) is located on the inboard side of the left console. UHF transmissions are made by holding the UHF VHF transmit switch on the throttle to the UHF position. Frequencies range from 225.00-399.975 mHz. The guard receiver monitors the guard frequency of 243.0 mHz. The control panel allows selection of 20 preset channels. The UHF radio is powered by the battery bus.

Function Knob

Functions are:

- OFF – Power off.
- MAIN – Power on, UHF operating on selected frequency.
- BOTH – Normal operation, plus receiving on guard frequency.
- ADF – Not operational.

Mode Knob

Functions are:

- MANUAL – UHF frequency is selected by manually setting the five frequency knobs.
- PRESET – UHF frequency is determined by the preset channel knob.
- GUARD – The main receiver and transmitter are automatically tuned to the guard frequency and the guard receiver is disabled.

Preset Channel Knob

The preset channel knob permits the selection of 1 of 20 preset frequencies with the mode knob at PRESET. Frequencies set for each channel can be manually written on a channel frequency chart located on an access door. Preset channel frequencies are set (or changed) as follows:

- Function knob – MAIN or BOTH.
- Mode knob – PRESET.
- Manual frequency knobs – Set to desired frequency.
- Preset channel knob – Set to desired channel.
- Lift access door.
- Depress PRESET button under access door.

Manual Frequency Knobs

The five manual frequency knobs allow manual selection of frequencies in steps of 0.025 mHz from 225.00-399.975 mHz.

Volume Knob

The volume knob is labeled VOL and controls the volume of the audio signal.

SQUELCH Switch

Functions are:

- ON – Enables squelch circuit which helps to eliminate background noise in normal reception.
- OFF – Disables squelch circuit to permit unhampered use of a weak signal.

TONE Button

Depressing the TONE button will interrupt reception and transmit a tone signal on the selected frequency.

UHF RADIO ANTENNA SWITCH [A] [BF]

The UHF radio antenna switch (figure 1-48) is located on the antenna select panel.

Functions are:

- UPPER – Upper antenna used to receive and transmit signals.

Antenna Locations (Typical)

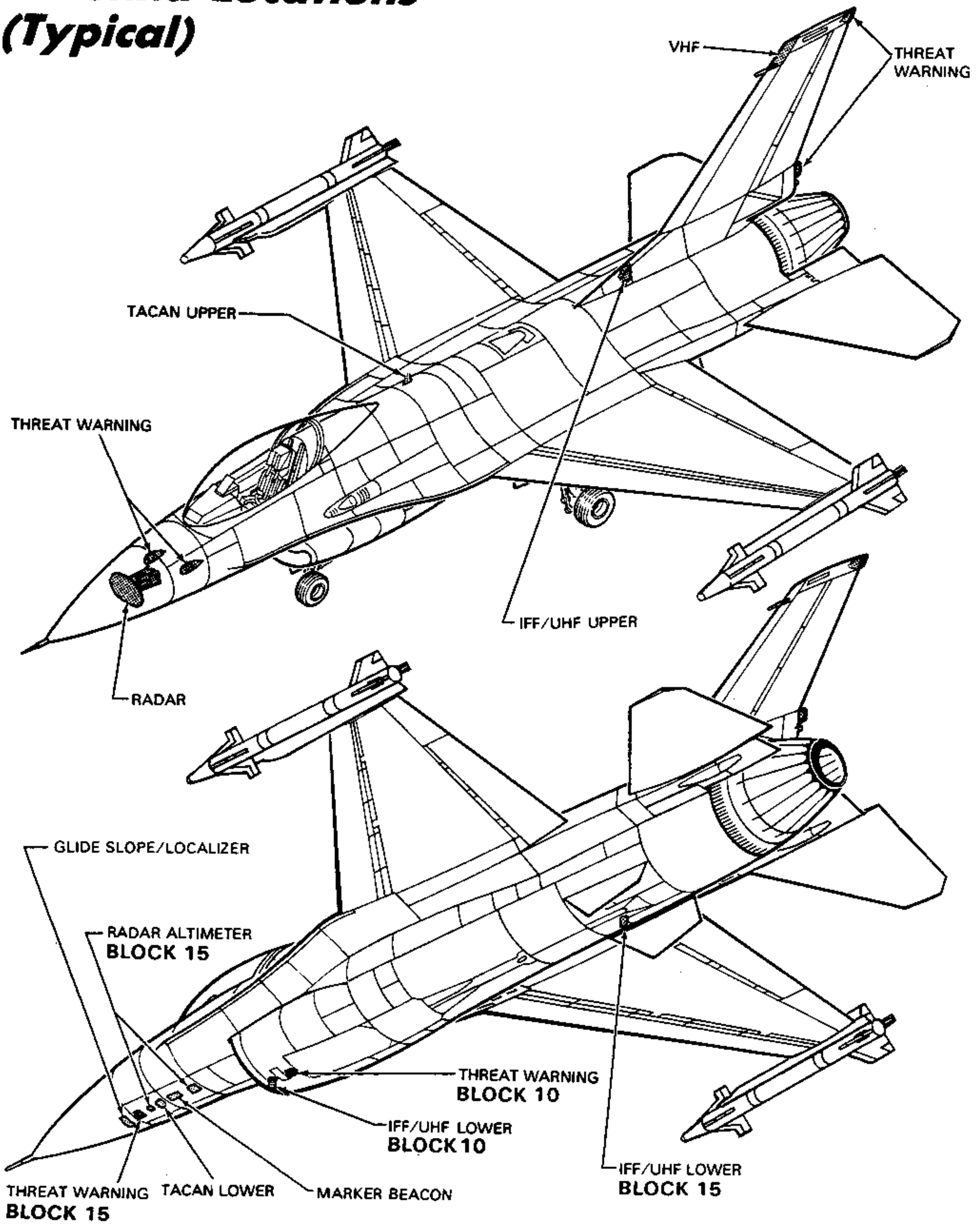
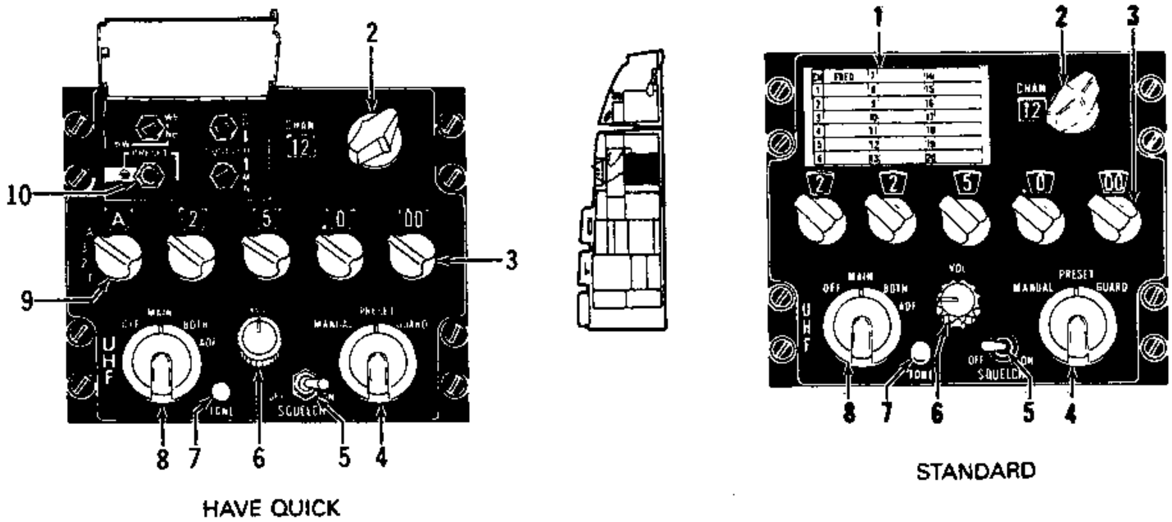


Figure 1-46.

UHF Radio Control Panel (Typical)



1. Preset Channel Card and Access Door
2. Preset Channel (CHAN) Knob
3. Manual Frequency Knobs
4. Mode Knob
5. SQUELCH Switch
6. Volume (VOL) Knob
7. TONE Button
8. Function Knob
9. A-3-2-T Knob
10. PRESET Button

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Figure 1-47.

- NORM – The antennas cycle between upper and lower to provide omnidirectional antenna pattern.
- LOWER – Lower antenna used to receive and transmit signals.

HAVE QUICK (HQ) SYSTEM US

The HQ system provides normal and antijamming mode air-to-air, air-to-ground UHF communication capability. The usual operating mode for an HQ UHF radio is in the normal mode where the radio uses 1 of 7000 channels. The antijamming (AJ) mode uses a frequency hopping scheme to change the channel or frequency many times per second. Because the particular frequency used at any instant depends on the precise time-of-day (TOD), both participating HQ UHF radios must have clocks which are synchronized. In addition, the HQ UHF radio uses word-of-day (WOD) and net number in the AJ mode.

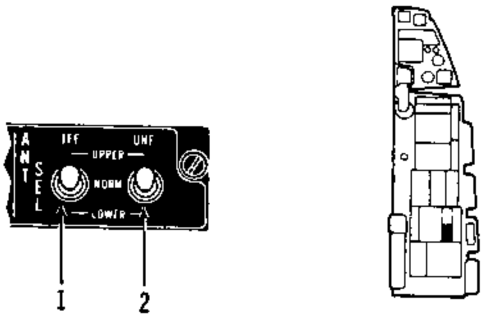
Word-of-Day (WOD)

The WOD entry is normally entered before flight, but it is possible to enter it in flight. WOD is entered by using one or more of the six preset channels which are 20-15. For a new WOD frequency entry, start at channel 20 and use the same method as in entering preset frequencies in the normal mode. The WOD frequency is set with the manual frequency knobs and the PRESET button. After a brief pause, a single or double beep tone is heard in the headset indicating that channel 20 is entered into preset memory. Channels 19, 18, 17, 16, and 15 are selected in that order for preset frequency entry. After each entry, a single beep is heard until after channel 15 entry; a double beep is heard indicating that the radio has accepted all six WOD entries.

WOD Transfer

If the radio is turned off, the WOD data is not lost but is stored. After the radio is turned back on, select

Antenna Select Panel A BF (Typical)



1. IFF Antenna Switch
2. UHF Radio Antenna Switch

1F-16A-1-0033

Figure 1-48.

the preset mode and, starting with preset channel 20, rotate the preset channel knob ccw. At channel 20, a single or double beep is heard. A single beep indicates that entry of WOD is not complete but channel 20 data has been transferred and accepted. After the single beep is heard, preset remaining channels (19-15) in the same manner until a double beep is heard indicating that WOD transfer is complete.

Time-of-Day (TOD) Transmission

The TOD entry is normally entered before flight, but it is possible to enter it in flight. It is possible to transmit and receive timing information in both normal and AJ modes by momentarily pressing the TONE button. In the normal mode, a complete TOD message is transmitted, while in the AJ mode only an updating time tick is used. A mode time transmission allows a time update if one radio has drifted out of synchronization.

Time-of-Day (TOD) Reception

Reception is possible in both normal and AJ modes. The radio automatically accepts only the first TOD message received after the radio is turned on. Subsequent messages are ignored unless the T position is selected with the A-3-2-T knob. The radio then accepts the next TOD update in either normal or AJ mode, provided TOD arrives within 1 minute of the time the T position has been selected. To receive time in the normal mode, rotate the A-3-2-T knob to T position and return to a normal channel in either manual or preset mode. To receive a time update in AJ mode, rotate the A-3-2-T knob to the T position and then back to the A position. A TOD update (time tick) can now be received on the selected AJ net.

Net Number

After TOD and WOD have been entered, any valid AJ net number can be selected by using the manual frequency knobs.

Antijamming (AJ) Mode Operation

To operate the HQ UHF radio in the AJ mode, proceed as follows:

- Function knob – MAIN or BOTH.
- Mode knob – PRESET.
- Enter the WOD in preset channels 20-15 and, starting with channel 20, rotate the preset channel knob ccw until a double beep is heard.
- Enter the TOD by selecting the frequency on which the TOD is being transmitted or by requesting a TOD transmission.
- Select an AJ net number either with the manual frequency knobs or any preset channel (1-14) designated for AJ net use.
- A-3-2-T knob – A.

A tone is heard in the headset if an invalid AJ net is selected, if TOD has not been initially received, or if WOD has not been entered. If the function knob is set to BOTH and the AJ mode is selected, any transmission on the guard channel takes precedence over the AJ mode.

HAVE QUICK (HQ) UHF RADIO US

The UHF radio provides line-of-sight communications. The UHF radio control panel (figure 1-47) is located on the inboard side of the left console. UHF transmissions are made by holding the UHF VHF

transmit switch on the throttle to the UHF position. Frequencies range from 225.00-399.975 mHz. The guard receiver monitors the guard frequency of 243.0 mHz. The control panel allows selection of 14 preset channels. The UHF radio is powered by the battery bus.

Function Knob

Functions are:

- OFF – Power off.
- MAIN – Power on, UHF operating on selected frequency.
- BOTH – Normal operation, plus receiving on guard frequency.
- ADF – Not operational.

Mode Knob

Functions are:

- MANUAL – UHF frequency is selected by manually setting the five frequency knobs.
- PRESET – UHF frequency is determined by the preset channel knob.
- GUARD – The main receiver and transmitter are automatically tuned to the guard frequency and the guard receiver is disabled.

Preset Channel Knob

The preset channel knob permits the selection of 1 of 14 preset frequencies (channels 1-14) with the mode knob at PRESET and the A-3-2-T knob in either 2 or 3. With the A-3-2-T knob in A and the mode knob at PRESET, the preset channel knob permits the selection of one of six preset WOD frequencies (channels 15-20). Preset channels used for WOD storage cannot be used as preset channels for normal radio operation. Frequencies set for each channel can be manually written on a channel frequency chart located on the access door. Preset channel frequencies are set (or changed) as follows:

- Function knob – MAIN or BOTH.
- Mode knob – PRESET.
- Manual frequency knobs – Set to desired frequency.
- Preset channel knob – Set to desired channel.
- Lift access door.
- Depress PRESET button under access door.

Manual Frequency Knobs

The five manual frequency knobs allow manual selection of frequencies in steps of 0.025 mHz from 225.00-399.975 mHz.

A-3-2-T Knob

Functions are:

- A – Selects AJ mode.
- 3 – Allows manual selection of frequencies.
- 2 – Allows manual selection of frequencies.
- T – Momentary position which enables the radio to accept a new TOD for up to 1 minute after selection. Also used in conjunction with the emergency startup of the TOD clock when TOD is not available from external sources.

Volume Knob

The volume knob is labeled VOL and controls the volume of the audio signal.

SQUELCH Switch

Functions are:

- ON – Enables squelch circuit which helps to eliminate background noise in normal reception.
- OFF – Disables squelch circuit to permit unhampered use of a weak signal.

TONE Button

Depressing the TONE button in normal or AJ mode will interrupt reception and transmit a tone signal on the selected frequency. Simultaneously pressing the TONE button in conjunction with the A-3-2-T knob in T position starts the emergency startup of the TOD clock.

VHF RADIO

The VHF radio provides line-of-sight voice communication. The VHF radio control panel (figure 1-49) is located on the right console. VHF transmissions are made by holding the UHF VHF switch on the throttle to the VHF position. Transmission and reception are available for AM from 116.000-151.975 mHz and for FM from 30.000-87.975 mHz. Only reception is available from 108.000-115.975 mHz. Twenty channels may be preset. Operation may be either on narrow band or wide band. Narrow band is used for all normal operations and wide band is automatically selected for secure voice.

Function Knob

Functions are:

- OFF – Power off.
- TR – Power on, VHF operating on selected frequency.
- D/F – Not operational.

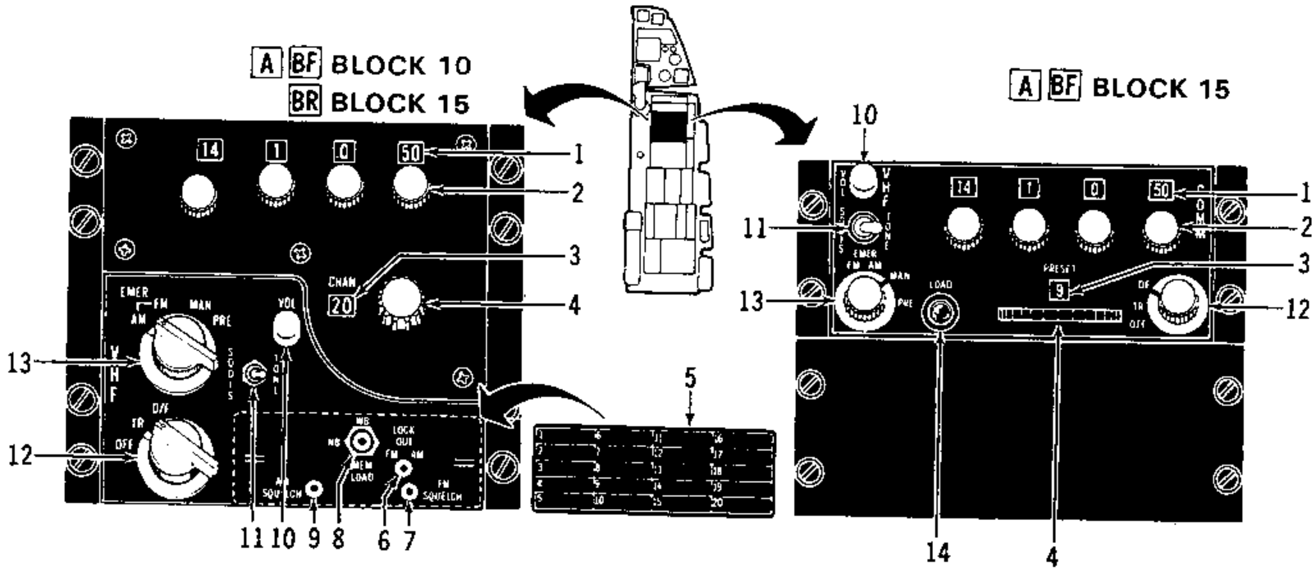
Preset Channel Knob

This knob permits selection of preset channels with the function knob at PRE. Frequencies set for each channel can be manually written on a preset channel card located on a snap-on cover.

Preset channel frequencies are set (or changed) as follows:

- Function knob – TR.
- Mode knob – MAN.
- Frequency knobs – set to desired frequency.
- Preset channel knob – set to desired channel.
- 46 A BF LOAD button – depress momentarily.
- LESS 46 A BF and 46 BR Remove snap-on cover and position bandwidth/MEM LOAD switch to MEM LOAD and release.

VHF Radio Control Panel (Typical)



1. Manual Frequency Indicator
2. Manual Frequency Knobs
3. Preset Channel Indicator
4. Preset Channel (CHAN) Knob
5. Preset Channel Card and Snap-on Cover
6. Bank LOCK OUT Switch (Preset)
7. FM SQUELCH Control (Preset)
8. WB MEM LOAD Switch
9. AM SQUELCH Control (Preset)
10. Volume (VOL) Knob
11. Squelch Disable (SQDIS)/Tone Switch
12. Function Knob
13. Mode Knob
14. LOAD Button

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Figure 1-49.

Mode Knob

Functions are:

- EMER AM – Provides reception and transmission on a preadjusted guard frequency between 119.000-124.000 mHz. To select this function, first set the function knob to TR and then set the mode knob to EMER AM.

- EMER FM – Provides reception and transmission on a preadjusted guard frequency between 38.0-43.0 mHz. To select this function, set the function knob to TR and the mode selector knob to EMER FM.

Selecting EMER AM or EMER FM automatically disables the secure voice function and enables normal voice communications.

- MAN – Frequency selected by the manual frequency knobs.

- PRE – Frequency selected by the preset channel knob.

Manual Frequency Knobs

The four manual frequency knobs allow manual selection of frequencies with the mode knob in MAN.

Volume Knob

The volume knob is labeled VOL. CW rotation increases the volume.

Squelch Disable/Tone Switch

The squelch disable/tone switch is a three-position toggle switch with positions marked SQ DIS, TONE, and an undesignated center position.

Functions are:

- SQ DIS – Disables the squelch. Squelch will remain disabled until the switch is returned to the center position.

- Center Position – Normal squelch operation.

- TONE – Switch may be momentarily held in this position to transmit a 1000 Hz tone. When the switch is released, it will automatically return to the center position.

LOAD Button 46 A BF

The LOAD button may be depressed momentarily to set a manual frequency into a preset channel.

Bandwidth/MEM LOAD Switch BR

Functions are:

- WB – Wideband is automatically selected for secure voice.

- NB – This position is used for all normal operations.

- MEM LOAD – Switch may be momentarily held in this position to set a manual frequency into a preset channel. When the switch is released, it will automatically return to the NB position.

RADIO CHANNEL/FREQUENCY INDICATOR (RCFI)

The RCFI (figure 1-50), located on the instrument panel, displays the selected channel or the manually selected frequency. When preset channel is displayed, the corresponding frequency may be verified by depressing the FREQ pushbutton.

46 With UHF radio in operation, depressing the UHF VHF pushbutton (unmarked) displays either UHF or VHF channel/frequency as indicated by the U or V indicator light.

LESS 46 Two small indicator lights on the right side of the indicator display a U or V during each radio transmission; however, the RCFI will not display a VHF channel/ frequency. The UHF radio must be on for the indicator lights to be displayed.

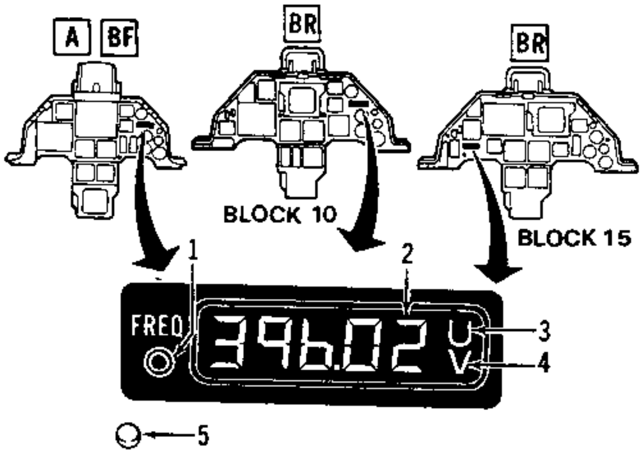
INTERCOM SET A BF

The communications control panel (figure 1-51) is located on the left console and is labeled COMM.

The intercom provides the following functions:

- Monitoring and volume control of voice communication between pilot and ground crew or tanker boom operator, AIM-9 missile tone, and TWS composite audio tone.

Radio Channel/Frequency Indicator (Typical)

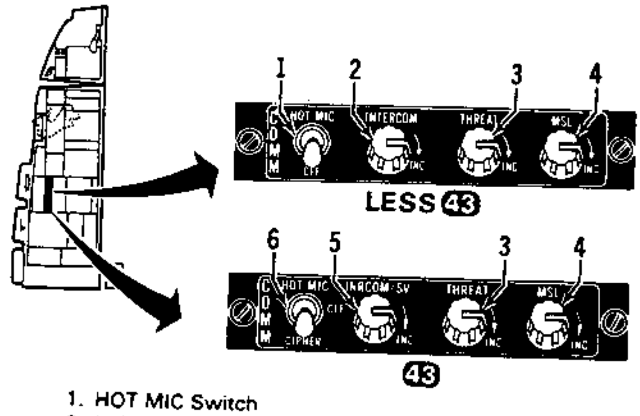


1. Frequency (FREQ) Pushbutton Switch
2. Radio Channel/Frequency Indicator
3. UHF Radio Transmission Indicator Light (White)
4. VHF Radio Transmission Indicator Light (White)
5. **BLOCK 15** UHF VHF Select Pushbutton (unmarked)

1F-16Y-1-0059

Figure 1-50.

Communications Control Panel A BF (Typical)



1. HOT MIC Switch
2. INTERCOM Knob
3. THREAT Tone Knob
4. Missile (MSL) Tone Knob
5. INRCOM/SV Knob
6. HOT MIC CIPHER Switch

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Figure 1-51.

- Monitoring of systems individually volume controlled from the respective UHF, VHF, TACAN, and ILS control panels.

- Monitoring of fixed volume warning tones: LG warning tone, TWS missile launch tone, IFF mode 4 alert tone, and low speed/(37) high pitch attitude warning tone.

HOT MIC CIPHER Switch (43)

Functions are:

- HOT MIC – Provides a microphone for pilot to ground crew or for AR. Activation of UHF VHF switch on the throttle will override this function.

- OFF – Disables HOT MIC CIPHER.

- CIPHER – Limits reception to secure voice only. This function is operable only when radio is operating in secure voice mode.

Missile Tone Knob

The missile (MSL) tone knob has a cw arrow pointing to INC. Rotating the knob cw increases the volume of the tone from the AIM-9 missile being monitored.

HOT MIC Switch LESS (43)

Functions are:

- HOT MIC – Provides a microphone for pilot to ground crew or for AR. Activation of the UHF VHF switch on the throttle will override this function.

- OFF – Disables HOT MIC.

INRCOM/SV Knob (43) A BF

The INRCOM/SV knob has a cw arrow pointing to INC. CW rotation increases the volume of both the intercom and secure voice systems.

INTERCOM Knob LESS (43)

The INTERCOM knob has a cw arrow pointing to INC. CW rotation increases the volume.

THREAT Tone Knob

The THREAT tone knob has a cw arrow pointing to INC. CW rotation increases the volume of the TWS composite tone.

MASTER ZEROIZE Switch (46) [A] [BF]

The MASTER ZEROIZE switch (figure FO-3) is a guarded two-position toggle switch. When positioned to MASTER ZEROIZE, coded electronic information such as MODE 4 IFF and secure voice is dumped.

SECURE VOICE SYSTEM [A] [BF]

The secure voice system is used in conjunction with the UHF and (43) VHF radios to provide secure voice communications. The system enciphers voice messages before they are transmitted and deciphers voice messages which are received. Normal radio procedures (turn-on, warmup, and channel selection) are not otherwise affected by the secure voice system.

Because of the operational requirements of the using command, either the TSEC/KY-28 or the TSEC/KY-58 may be installed. Refer to figure 1-52.

TSEC/KY-28

Operation of the KY-28 requires the selected UHF or (43) VHF radio to be operating and the desired channel selected.

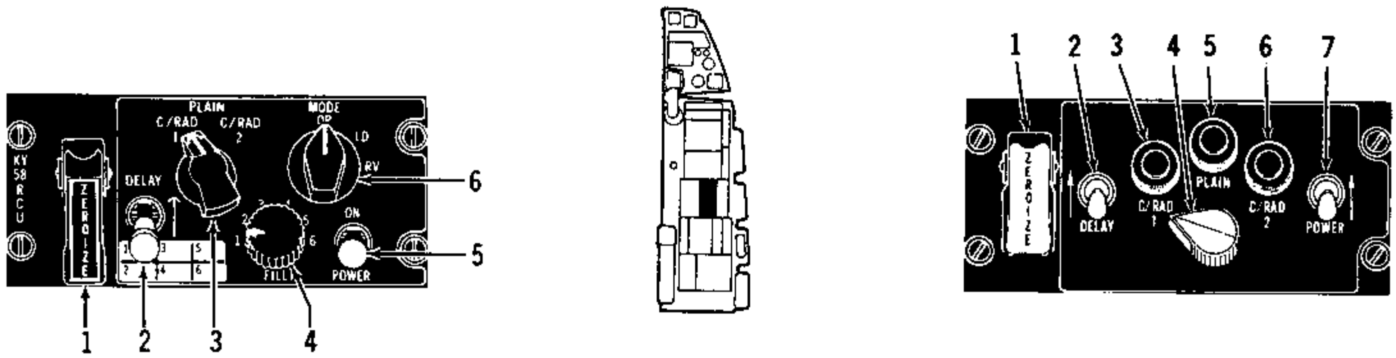
POWER Switch

The POWER switch is a two-position switch labeled POWER (off) and an arrow pointing in the direction of power on. The on position enables the secure voice system.

ZEROIZE Switch

The ZEROIZE switch is a toggle switch guarded to the OFF position. When activated, the switch dumps all variables of the secure voice systems, disabling secure voice operation.

Secure Voice Panel [A] [BF] (Typical)



TSEC/KY-58

1. ZEROIZE Switch (Guarded)
2. DELAY Switch (Lever Lock)
3. PLAIN Cipher Switch
4. FILL Switch
5. POWER Switch (Lever Lock)
6. MODE Switch

TSEC/KY-28

1. ZEROIZE Switch (Guarded)
2. DELAY Switch
3. C/RAD 1 Indicator Light
4. PLAIN Cipher Switch
5. PLAIN Indicator Light
6. C/RAD 2 Indicator Light
7. POWER Switch

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Figure 1-52.

DELAY Switch

The DELAY switch is a two-position toggle switch with an arrow pointing in the direction of on. The delay function is not used.

PLAIN Cipher Switch

The PLAIN cipher switch is a three-position rotary switch.

Functions are:

- C/RAD 1 – Provides secure voice operation with COMM 1 (UHF). A green press-to-test light comes on to indicate that the PLAIN cipher switch is in C/RAD 1 position.
- PLAIN – Allows normal radio communications. An amber press-to-test light comes on to indicate that the PLAIN cipher switch is in the PLAIN position.
- C/RAD 2 – Provides secure voice operation with COMM 2 (VHF). A green press-to-test light comes on to indicate that the PLAIN cipher switch is in C/RAD 2 position.

43 During C/RAD 1 or C/RAD 2 operation, plain text messages can still be received when the HOT MIC CIPHER switch (located on the communication control panel) is not in the CIPHER position.

When operating in secure voice mode (C/RAD 1 or C/RAD 2), the volume of the received messages is controlled by the communication control panel. The radio set volume control is disabled.

TSEC/KY-58

Operation of the KY-58 requires the selected UHF or 43 VHF radio to be operating and the desired channel selected.

ZEROIZE Switch

The ZEROIZE switch is a guarded lever locked switch. When activated, the switch dumps all variables of the secure voice system, disabling secure voice operation.

DELAY Switch

The DELAY switch is a two-position lever lock switch. The delay function is not used.

FILL Switch

The FILL switch is a six-position rotary switch. Each position selects that memory location of the KY-58 that will be used for the selected operating mode.

POWER Switch

The POWER switch is a two-position lever lock switch. The ON position enables the secure voice system.

MODE Switch

The MODE switch is a three-position rotary switch.

Functions are:

- OP (operational) – Normal operation for transmitting and receiving plain and cipher messages.
- LD (load) – Allows the secure voice system to accept a variable from a fill device or another KY-58.
- RV (receive variable) – This position is used in remote keying operations.

PLAIN Cipher Switch

The PLAIN cipher switch is a three-position rotary switch.

Functions are:

- C/RAD 1 – Allows radio 1 (UHF) to transmit and receive secure voice messages.
- PLAIN – Only plain voice messages can be transmitted and received.
- C/RAD 2 – Allows radio 2 (VHF) to transmit and receive secure voice messages.

43 During C/RAD 1 or C/RAD 2 operation, plain text messages can still be received when the HOT MIC CIPHER switch (located on the communication control panel) is not in the CIPHER position.

When operating in secure voice mode (C/RAD 1 or C/RAD 2), the volume of the received messages is controlled by the communications control panels. The radio set volume control is disabled.

INERTIAL NAVIGATION SET (INS)

The INS is a prime sensor for aircraft velocity, attitude, and heading and is a source of navigation information. The INS consists of the INU, the FCNP, and the INU battery.

The INS in conjunction with the FCC provides:

- Present position with update and storage capability.
- Current winds.
- Groundspeed and drift angle.
- Great circle course computation with steering provided to 74 23 destinations (20 coordinate, 3 UTM) and **LESS** 74 13 destinations (10 coordinate, 3 UTM) with 3 mark points.

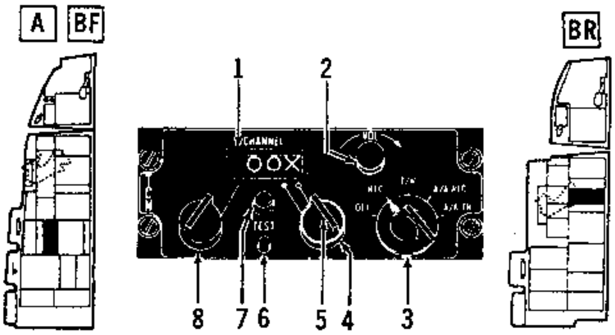
For a detailed system description, refer to T.O. 1F-16A-34-1-1.

TACTICAL AIR NAVIGATION (TACAN) SYSTEM

The TACAN system provides continuous bearing and distance information from any selected TACAN station within a line-of-sight distance up to approximately 300 miles, depending upon terrain and aircraft altitude. Only distance information is presented when a DME navigational aid is selected. There are 252 channels available for selection. Two antennas (figure 1-46), one on top and one on the bottom of the fuselage, provide omnidirectional coverage regardless of aircraft attitude.

The TACAN works in conjunction with the instrument mode select panel and the HSI and through the communication panel for audio output. TACAN information is presented on the HSI. Refer to figure 1-53.

TACAN Control Panel (Typical)



1. CHANNEL Display
2. Volume (VOL) Knob
3. Function Knob
4. X/Y Channel Ring
5. Units Channel Knob
6. TEST Pushbutton
7. Test Light (Red)
8. Hundred-Tens Channel Knob

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Figure 1-53.

TACAN Function Knob

Functions are:

- OFF – Power off.
- REC – Receive mode. The system receives signals which result in a bearing and course deviation display on the HSI and audio in the headset. TACAN range window (MILES) on HSI is shuttered.
- T/R – Transmit/receive mode. Same as REC and in addition, interrogates the TACAN ground station for DME information; distance (NM) is displayed in the HSI range window (MILES).
- A/A REC – Air-to-air receive mode is not used.
- A/A TR – Air-to-air transmit-receive mode. TACAN system interrogates and receives signals from aircraft having air-to-air capability, providing slant range (NM) distance between aircraft operating 63 TACAN channels apart. (KC-10A also provides bearing information.) Up to five aircraft can determine distance from a sixth lead aircraft. Lead aircraft can only determine distance from one aircraft. Audio identification is not provided.

Volume Knob

The VOL knob varies the audio identification volume in the headset.

X/Y Channel Ring

The X/Y channel ring is the outer portion of the units knob. The ring provides for the selection of X or Y channels as viewed in the channel display. Each mode has 126 channels available.

Units Channel Knob

The units channel knob is used to select the units digit of the channel (0-9) as viewed in the channel display.

Hundreds – Tens Channel Knob

The hundreds – tens channel knob is used to select the tens and hundreds digits (00-12) as viewed in the channel display.

CHANNEL Display

The channel display is labeled CHANNEL and displays the digital readout of the selected TACAN channel.

TEST Pushbutton

The TEST pushbutton initiates system self-test when depressed momentarily. The self-test checks the entire system except the antennas.

TEST Light

The TEST light illuminates when a malfunction occurs during manual or automatic system self-test. If the system fails self-test in the T/R mode but not in the REC mode, the TACAN may be used for bearing information.

INSTRUMENT LANDING SYSTEM (ILS) US DE NO

The ILS provides precision approaches to runways equipped with localizer, glide slope, and marker beacon equipment. Localizer identification signals are supplied to the headset for station identification. The glide slope and localizer receivers supply glide slope and localizer deviation data to the deviation bars on the ADI and HUD; the HSI also displays course or localizer deviation data. Two warning flags, designated LOC and GS, appear on the ADI when deviation data is invalid. A course deviation warning flag appears on the HSI if localizer deviation data is invalid. HUD symbology consists of localizer and glide slope deviation bars. Dashed deviation bars indicate invalid data. Deviation bars are roll stabilized with tic marks positioned at the one- and two-dot deflections.

The flight director displays pitch and bank steering data on the HUD when selected on the FCNP. Symbology consists of a circle, a tic mark positioned at the top of the circle, and a reference mark/caret positioned at the heading/ground track scale. (Refer to figure 1-58.) The flight director circle is referenced to the FPM and appears when localizer data is valid. The tic mark appears when glide slope deviation nears center, indicating that pitch steering data is valid. The reference caret indicates the course selected on the FCNP. The course value indicated by the flight director caret may be changed only by entering the new value through the FCNP. Refer to T.O. 1F-16A-34-1-1 for course selection on the FCNP.

If the aircraft approaches above glide slope, there will be no pitch steering data. The flight director symbol will remain on the horizon, displaying bank steering data, and the symbol X will appear over the tic mark, indicating that pitch steering data is invalid. Pitch steering is acquired once the glidepath is intercepted.

The marker beacon receiver operates on a fixed frequency of 75 mHz. Refer to MARKER BEACON LIGHT, this section.

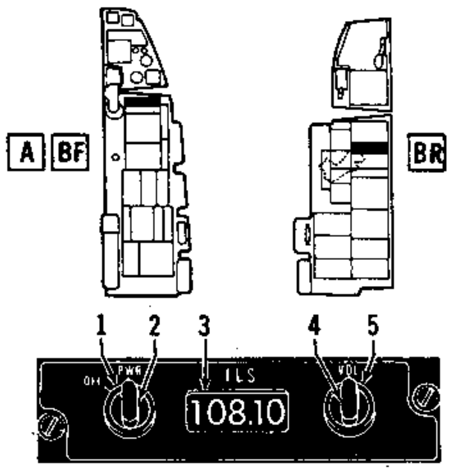
ILS Frequency Knobs

The frequency knobs, located on the ILS control panel, allow individual selection of 40 localizer frequencies ranging from 108.1-111.95 mHz in 0.05 mHz increments using odd frequencies (.1, .3, etc.). Each localizer frequency selected is paired with a glide slope frequency (329.15-335.0 mHz). The localizer frequency selected is displayed on the control panel.

ILS Power Switch

The power switch is an outer ring on the frequency knob. In the OFF position, power is removed from localizer, marker beacon, and glide slope receivers. When the switch is placed to PWR, power is applied to the localizer, marker beacon, and glide slope receivers.

ILS Control Panel (Typical)



1. Outer Ring Power (PWR) Switch
2. Frequency (units) Knob
3. Frequency Display
4. Frequency (tenths) Knob
5. Outer Ring-Volume (VOL) Ring

1F-16X-1-0031

Figure 1-54.

ILS Volume Ring

The volume ring adjusts the volume of the localizer station identification signal. CW rotation increases volume.

Marker Beacon Light

The marker beacon light (figure FO-3) is located on the instrument panel. When the aircraft is over a marker beacon facility, the MRK BCN bull's-eye glows green and blinks according to the code of the marker beacon.

IFF SYSTEM

The air-to-surface IFF system provides selective identification feature (SIF), automatic altitude reporting, and (mode 4) encrypted IFF. Normal operation is possible in any of five modes:

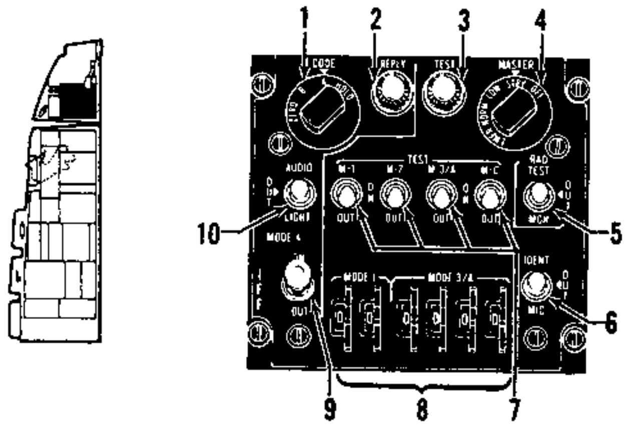
- Mode 1 – Security identity.
- Mode 2 – Personal identity.
- Mode 3/A – Traffic identity.
- Mode 4 – Encrypted identity.
- Mode C – Altitude reporting.

The equipment does not perform interrogation but only transmits coded replies to correctly coded interrogations. Refer to figure 1-46 for antenna locations. Modes 2 and 4 code settings are set into the receiver-transmitter on the ground and thus are fixed for any one flight. Modes 1 and 3/A codes are set at the control panel. All modes can be turned on or off at the control panel. Mode C provides altitude information from the CADC to the ground in 100-foot increments. Refer to figure 1-55.

Mode 4 CODE Knob

The mode 4 CODE knob must be pulled out before it can be moved to the ZERO position and is spring-loaded from HOLD to the A position.

IFF Control Panel A BF (Typical)



1. Mode 4 CODE Knob
2. REPLY Light (Green)
3. TEST Light (Green)
4. MASTER Knob
5. RAD TEST MON Switch
6. Identification of Position Switch
7. Mode TEST Switches (4)
8. Code Wheels
9. MODE 4 Switch
10. MODE 4 Monitor Switch

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Figure 1-55.

Functions are:

- HOLD – Both code settings can be retained after flight by positioning the MODE 4 CODE knob to the HOLD position momentarily and waiting 15 seconds or more prior to placing the MASTER knob to OFF or removal of power.

- A and B – The positions select the preset code for the present and succeeding code periods, respectively.

- ZERO – Both code settings will zeroize if the MASTER knob is in any position except OFF. Both codes are automatically zeroized when the IFF is turned off after landing if the HOLD mode is not used.

REPLY Light

The REPLY light illuminates green to indicate mode 4 replies. The light is operative only when the mode 4 monitor switch is in AUDIO or LIGHT.

TEST Light

When a mode test switch is held in TEST, the TEST light will illuminate green to indicate the mode is operable. When any of the mode test switches are placed to ON and the RAD TEST MON switch is in MON, the light may light because of external interrogations.

IFF MASTER Knob

Functions are:

- OFF – Removes power from the equipment and also zeroizes mode 4 code settings unless the HOLD function is used. The knob must be pulled outward to rotate from STBY to OFF.

- STBY – The equipment is turned on and warmed up but will not transmit.

- LOW – Only local (strong) interrogations are recognized and answered.

- NORM – Full range recognition and reply occur. Transmitted power from the IFF system is the same for both the LOW and NORM positions.

- EMER – The knob must be pulled outward to position to EMER. When so positioned, an emergency-indicating pulse group is transmitted each time a mode 1, 2, or 3/A interrogation is recognized.

Radiation Switch

The RAD TEST MON switch is spring-loaded from the TEST position to the OUT position.

Functions are:

- OUT – The radiation test and monitor circuits are inoperative.

- TEST – Used for preflight check.

- MON – Used with the built-in test capability.

Identification-of-Position (I/P) Switch

Functions are:

- IDENT – Spring-loaded out of IDENT. When so positioned, the I/P timer is energized for 15-30 seconds. If a mode 1, 2, or 3/A interrogation is recognized within this 15-30 second period, I/P replies will be made.

- MIC – When UHF VHF transmit switch on throttle is placed to UHF, I/P timer is energized for 15-30 seconds. If a mode 1, 2, or 3A interrogation is present, I/P replies will be made.

- OUT – Transmission of I/P replies is prevented.

Mode TEST Switches

Four mode TEST switches, located on the IFF control panel, are labeled TEST, ON, and OUT. The switches are labeled M-1, M-2, M-3/A, and M-C from left to right to correspond to mode 1, mode 2, mode 3/A, and mode C. The OUT position for each switch disables the transmitter-receiver for the mode selected. The ON position for each switch enables the transmitter-receiver to reply to interrogations for the mode selected. If more than one switch is placed to ON, the transmitter-receiver will reply to interrogations for all modes selected. The switches are spring-loaded to the ON position from the TEST position. Modes 1, 2, 3/A, and C can be tested by holding the associated mode select/test switch in TEST. If the TEST light comes on while the mode select/test switch is held in TEST, the related mode is functioning properly.

Code Wheels

Two sets of thumb-actuated code wheels are labeled MODE 1 and MODE 3/A codes. The set of wheels labeled MODE 1 consists of 2 wheels which allow selection of 32 different codes. The set of wheels labeled MODE 3/A consists of 4 wheels which provide the capability of setting 4096 codes. Code digits on each wheel are read in windows recessed in the face of the panel.

MODE 4 Switch

Functions are:

- ON – Mode 4 operation is enabled. Lever-locked position.
- OUT – Mode 4 operation is disabled.

MODE 4 Monitor Switch

Functions are:

- AUDIO – Monitoring of mode 4 interrogations and replies is provided by an audio tone on the intercom and by illumination of the REPLY light on the IFF control panel.
- LIGHT – Switches out the audio tone and provides monitoring only by the REPLY light.
- OUT – Both the audio tone and the REPLY light are inoperative.

IFF Antenna Switch

The three-position antenna switch (figure 1-48) is located on the antenna select panel.

Functions are:

- UPPER – Upper antenna used to receive and reply to interrogation signals.
- NORM – The antenna signals rapidly cycle between the upper and lower antennas.
- LOWER – Lower antenna used to receive and reply to interrogation signals.

IFF IDENT Button

A pushbutton located on the miscellaneous panel (figure FO-3) provides an alternate method of initiating the I/P function of the IFF system. Pushing the button momentarily will cause the system to transmit an I/P reply for 15-30 seconds if the system recognizes a mode 1, 2, or 3/A interrogation. NC A BF The alternate I/P function is not installed.

IFF Caution Light

The IFF caution light is located on the caution light panel (figure FO-15). The light will illuminate whenever an inoperative mode 4 capability is detected, provided the mode 4 computer is installed in the aircraft and the MASTER knob is not in the OFF position. Specific discrepancies monitored by the IFF caution light are as follows:

- Mode 4 codes zeroized.
- Failure of the system to reply to proper mode 4 interrogation.
- Automatic self-test function of the mode 4 computer reveals a faulty computer.

INSTRUMENT MODE SELECT PANEL

The instrument mode select panel (figure 1-56), located on the instrument panel, provides for the selection of the displays on the HSI and the ADI. When an ILS mode is selected on the instrument mode select panel, the localizer and glide slope deviation bars are also displayed on the HUD. ILS information is provided to the HUD from the ILS regardless of the fire control/navigation mode selected. Navigation control panels and instruments are shown in figure 1-57. Instrument displays for the different modes are shown in figure 1-58.

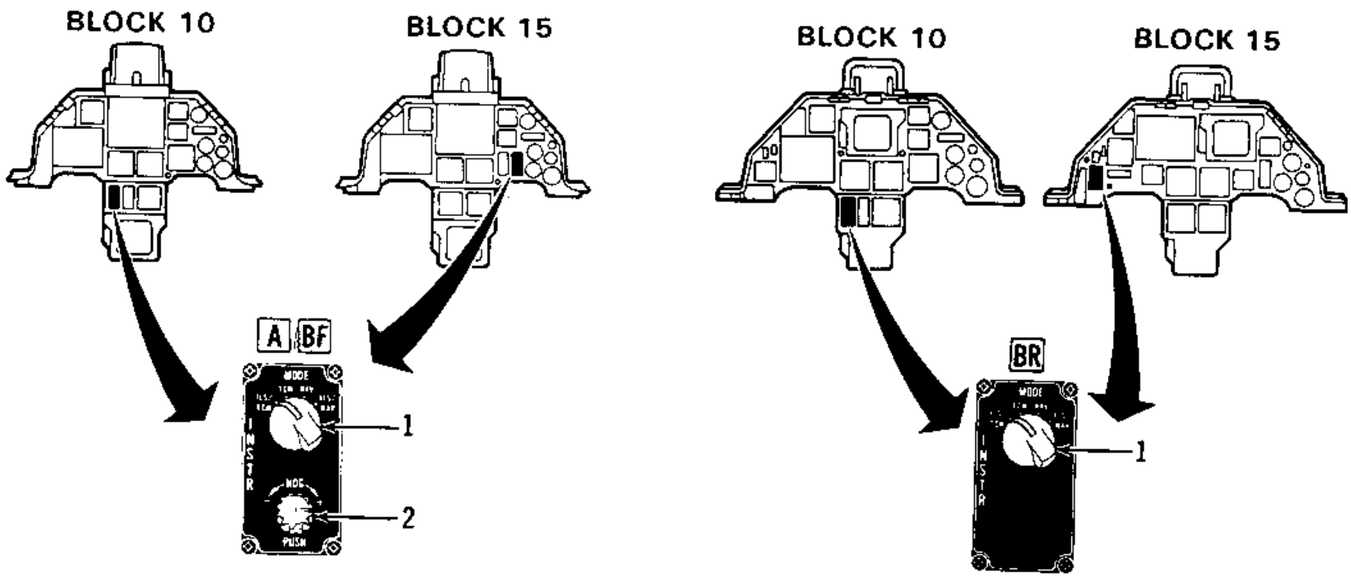
INSTR MODE Knob

The functions of the INSTR MODE knob (figure 1-56) are detailed and shown in figure 1-57. For details of the ADI and HSI in the instrument modes, refer to figure 1-58.

Heading Set Knob [A] [BF]

The heading set knob (figure 1-56) is labeled HDG with arrows in both directions. The knob is pushed and turned to set the INS heading to a known magnetic heading in the event of an INS failure (indicated by the AUX flag on the ADI).

Instrument Mode Select Panel

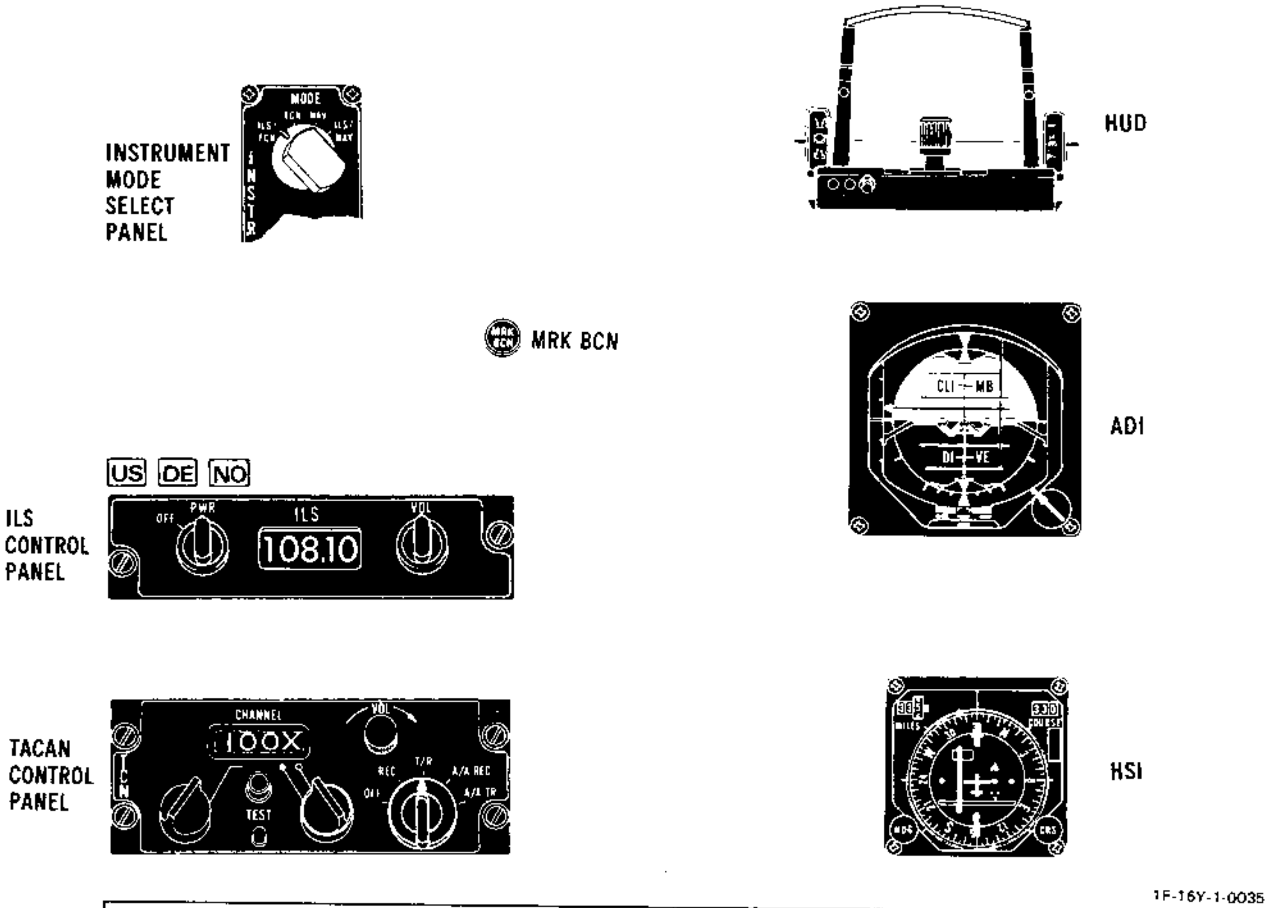


1. INSTR MODE Knob
2. Heading (HDG) Set Knob, (INS)

1F-16Y-1-0034

Figure 1-56.

Navigation Aids and Display (Typical)



<table>
<tr><th></th><th colspan="5">HSI PRESENTATION</th><th colspan="3">ADI PRESENTATION</th></tr>
<tr><th>INSTRUMENT MODE SELECTED</th><th>RANGE INDICATOR</th><th>COURSE ARROW & COURSE SELECTED</th><th>COURSE DEVIATION BAR</th><th>TO — FROM INDICATOR</th><th>BEARING POINTER</th><th>ATTITUDE SPHERE</th><th>VERTICAL DEVIATION BAR</th><th>HORIZONTAL DEVIATION BAR</th></tr>
<tr><td>ILS/TCN</td><td rowspan="2">RANGE TO TACAN STATION OR DME NAV AID</td><td>MAN SET LOCALIZER COURSE</td><td>LOCALIZER DEVIATION</td><td>OUT OF VIEW</td><td rowspan="2">BEARING TO TACAN STATION</td><td rowspan="4">INS ROLL AND PITCH ATTITUDE</td><td>LOCALIZER DEVIATION</td><td>GLIDE SLOPE DEVIATION</td></tr>
<tr><td>TCN</td><td rowspan="2">MAN SET SELECTED COURSE</td><td>DEVIATION FROM SELECTED COURSE</td><td>IN VIEW</td><td rowspan="2">OUT OF VIEW</td><td rowspan="2">OUT OF VIEW</td></tr>
<tr><td>NAV</td><td rowspan="2">RANGE TO INS DESTINATION</td><td>*INACTIVE
**DEVIATION FROM SELECTED COURSE</td><td rowspan="2">OUT OF VIEW</td><td rowspan="2">BEARING TO INS DESTINATION</td></tr>
<tr><td>ILS/NAV</td><td>MAN SET LOCALIZER COURSE</td><td>LOCALIZER DEVIATION</td><td>LOCALIZER DEVIATION</td><td>GLIDE SLOPE DEVIATION</td></tr>
</table>

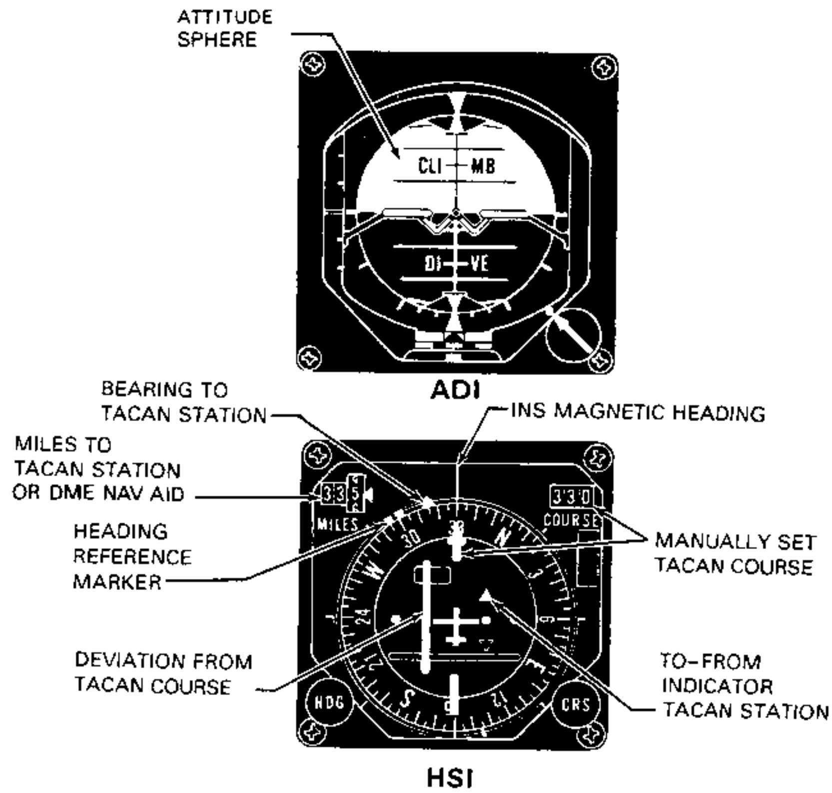
*BLOCK 10 **BLOCK 15

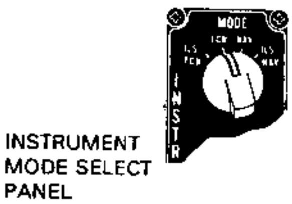
Figure 1-57.

Instrument Modes (Typical)

TCN

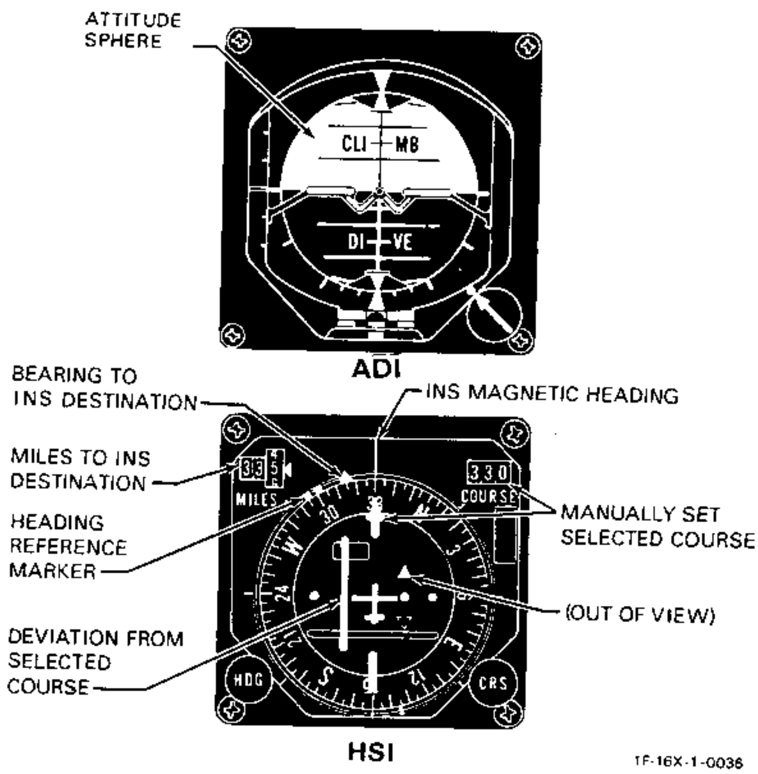
NOTE: The TCN mode has no effect on HUD symbology.





NAV

NOTE: The NAV mode has no effect on HUD symbology.



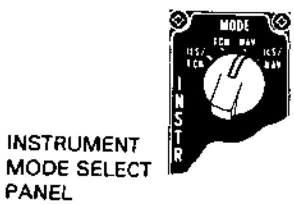


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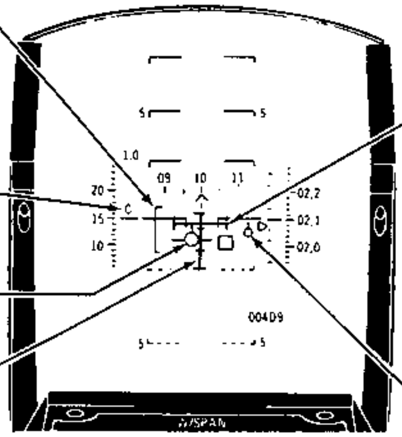
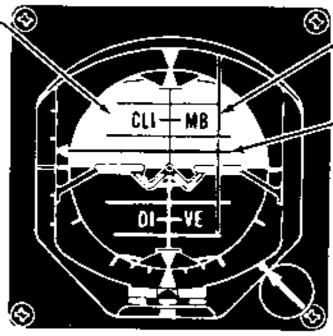
Figure 1-58. (Sheet 1)

Instrument Modes (Typical)

ILS/TCN US DE NO



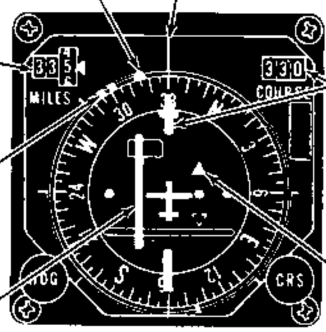
HUD



ADI

NOTE: **Glide slope and localizer bars indicate deviation only, not steering.**

INSTRUMENT MODE SELECT PANEL



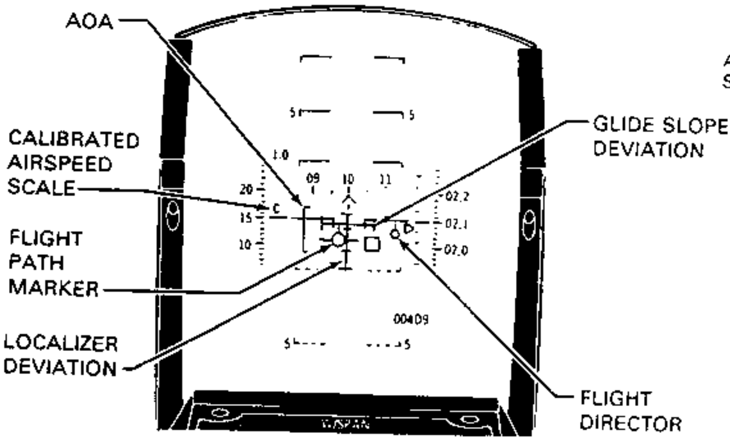
HSI

1F-16A-1-0312

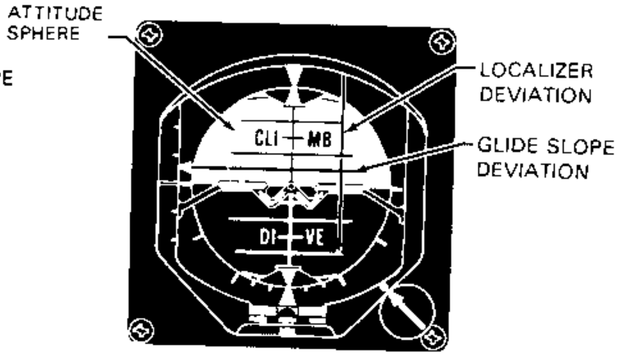
Figure 1-58. (Sheet 2)

Instrument Modes (Typical)

ILS/NAV US DE NO



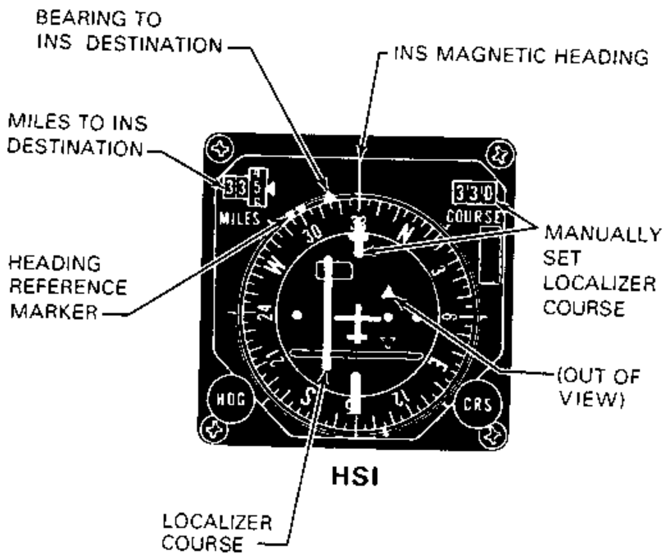
HUD



ADI

NOTE: **Glide slope and localizer bars indicate deviation only, not steering.**

INSTRUMENT MODE SELECT PANEL



HSI

1F-16A-1-0037

Figure 1-58. (Sheet 3)

FLIGHT INSTRUMENTS

The flight instruments (figure 1-59) are located on the instrument panel. The instruments listed below are common and are not illustrated in detail.

- Airspeed/Mach Indicator
- Servo-Pneumatic Altimeter
- Clock
- Magnetic Compass
- Standby Attitude Indicator
- Vertical Velocity Indicator

ALTIMETER

The servo-pneumatic altimeter (figure 1-59) is a dual mode pressure altitude indicator with a range of -1000 to +80,000 feet. The operating mode is manually selected by the mode lever located at the lower right corner of the instrument. In the ELECT (primary) operating mode, the altimeter is an electronic-servoed repeater indicator that is electrically driven by the CADC. In the PNEU (secondary) operating mode, the altimeter is pneumatically operated by static pressure supplied by the pitot-static system. Should the CADC or altimeter servo malfunction while the altimeter is operating in ELECT, the altimeter will automatically revert to the pneumatic mode and the PNEU flag will appear on the face of the altimeter. This may occur when accelerating or decelerating through the transonic region or while performing high g maneuvers.

The barometric setting knob, located at the lower left corner of the instrument, is used to set the desired altimeter setting. A BF The barometric setting of the altimeter is electrically transmitted to the CADC as a manual input correction for the pressure altitude display on the HUD. DE BE NE NO The barometric setting is shown in millibars. US The barometric setting is shown in inches of mercury.

AIRSPEED/MACH INDICATOR

The airspeed/mach indicator (figure 1-59) is pneumatically operated by total and static pressure supplied by the pitot-static system. The indicator displays indicated airspeed, mach number, and maximum equivalent airspeed. Indicated airspeed is displayed by a moving pointer against a fixed dial graduated in knots. Mach number, which is read against the airspeed pointer, is displayed by a rotating disc graduated in mach numbers. The range of the indicator is from 80-850 knots and from 0.5-2.2 mach.

The maximum allowable equivalent airspeed is displayed by a pointer which moves around the inner periphery of the fixed instrument dial. The pointer is adjusted to indicate 800 knots at sea level.

The SET INDEX knob is used to set the airspeed reference index.

STANDBY ATTITUDE INDICATOR (SAI)

The SAI (figure 1-59) is powered independently of the ADI by the battery bus. The indicator is a self-contained, electrically powered vertical gyroscope that mechanically positions the attitude sphere of the indicator to display aircraft roll and pitch attitudes. Manual caging of the gyroscope is accomplished by pulling the PULL TO CAGE knob at the lower right corner of the indicator. The knob is held out until the sphere is caged to zero pitch and roll indication and then released. Adjustment of the miniature aircraft reference symbol is accomplished by rotation of the PULL TO CAGE knob.

Since the SAI is mounted in the instrument panel at an angle, it will indicate a pitch angle of 4 degrees less than the ADI when pitch trim knobs on both indicators are set at the pitch trim index. If caging is required, the aircraft should be flown wings level, constant altitude, and at an AOA of approximately +4 degrees. When caged on the ground, allow 2 minutes prior to taxi.

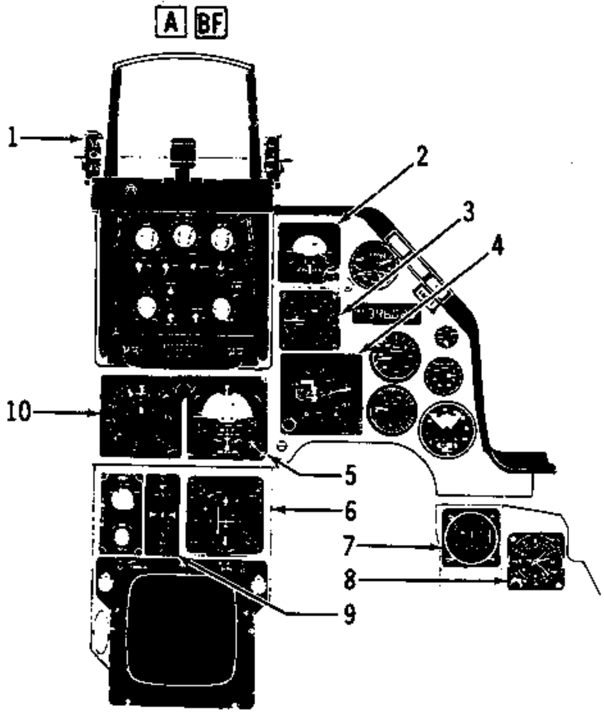
A warning flag labeled OFF appears whenever electrical power is lost or whenever the PULL TO CAGE knob is pulled. After power loss, the indicator will continue to provide usable attitude information for approximately 9 minutes. The gyroscope of the indicator is unrestricted in roll but is limited to approximately ±85 degrees in pitch.

The indicator can develop errors during aerobatic maneuvering, primarily when pitch is near 90 degrees. If these errors exceed 7 degrees after returning to level flight, erection will be cut off. If this occurs, the gyro will not automatically erect and must be manually caged to eliminate the error.

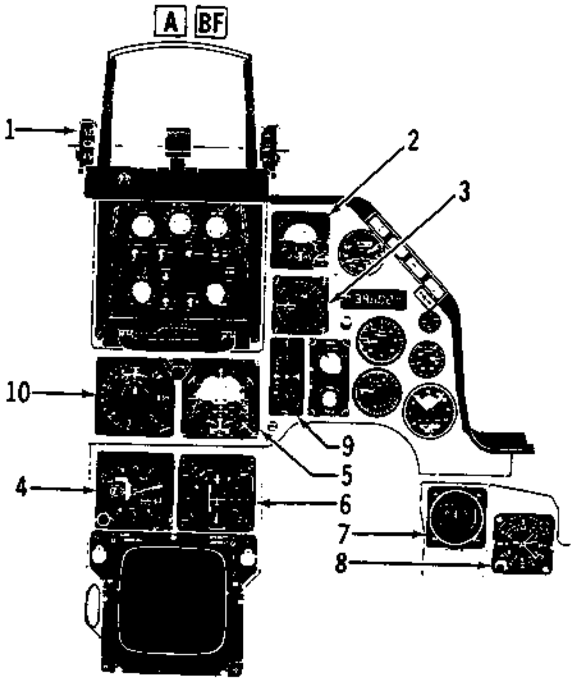
VERTICAL VELOCITY INDICATOR (VVI)

The VVI (figure 1-59) provides rate of climb/descent information and operates from static pressure supplied by the aircraft pitot-static system. Range of the indicator is 6000 fpm climb or dive.

Flight Instruments (Typical)

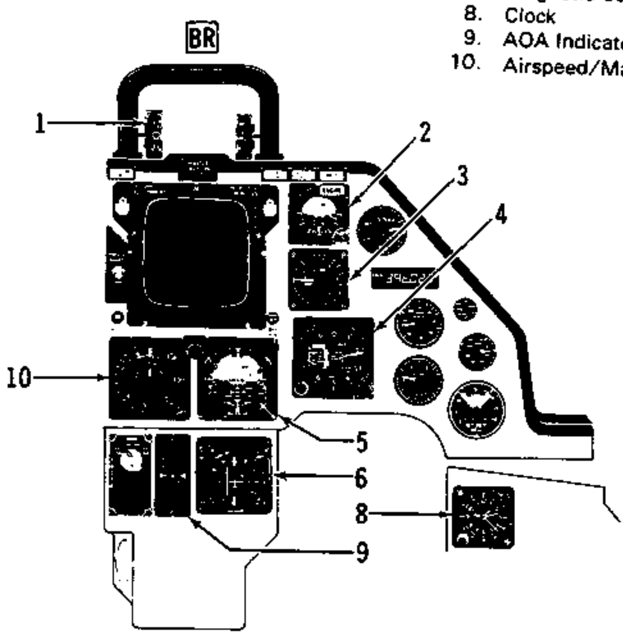


BLOCK 10

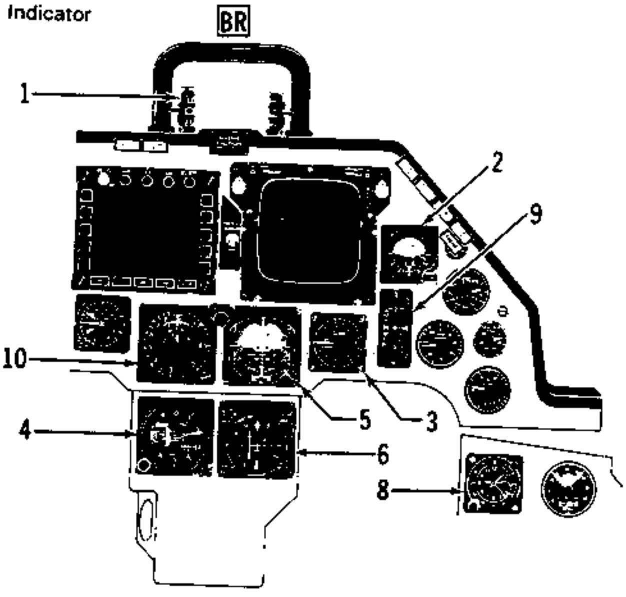


BLOCK 15

1. AOA Indexer
2. Standby Attitude Indicator
3. Vertical Velocity Indicator
4. Altimeter
5. Attitude Director Indicator
6. Horizontal Situation Indicator
7. Magnetic Compass
8. Clock
9. AOA Indicator
10. Airspeed/Mach Indicator



BLOCK 10



BLOCK 15

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Figure 1-59.

MAGNETIC COMPASS

The magnetic compass (figure 1-59) is a self-contained indicator that shows the heading of the aircraft with respect to magnetic north. Adjustable compensating magnets in the compass provide the means for cancelling magnetic disturbances originating within the aircraft. A deviation correction card for the compass is located immediately below and aft of the compass.

ATTITUDE DIRECTOR INDICATOR (ADI)

The ADI (figure 1-60) is a servoed repeater indicator that displays roll and pitch attitude information supplied by the INS. The ADI is not limited in pitch or roll and will display any aircraft attitude accurately. In certain modes of operation, the indicator displays ILS glide slope and localizer deviation information. Refer to figure 1-57. The instrument displays turn rate which is presented in standard turn needle format. The turn rate needle is driven by the rate gyroscope transmitter which senses the aircraft turn rate and will displace one needle width in response to a 1-1/2-degree/second turn rate. The slip indicator (ball) is a self-contained item. The OFF warning flag may indicate failure of either the INS or the ADI. The GS flag indicates that the glide slope deviation bar is unreliable. The LOC flag indicates that the localizer signal is unreliable. The AUX flag signifies that the INS has failed or is operating in a less precise attitude condition and that HSI heading must be set to a known heading by the HDG knob on the instrument mode select panel. The pitch trim knob is used to adjust the attitude sphere to the desired pitch attitude in reference to the miniature aircraft.

HORIZONTAL SITUATION INDICATOR (HSI)

The HSI (figure 1-61) is a servoed repeater indicator that provides a horizontal or plan view of the aircraft with respect to the navigation situation. The miniature aircraft symbol in the center of the HSI is fixed and comparable to an aircraft superimposed on a compass rose. The face of the HSI is a compass card driven by the INS so that aircraft magnetic heading is always read at the upper lubber line.

The HDG set knob provides the means for rotating the heading reference marker to the desired heading. Once set, the heading reference marker rotates with the compass card. The heading reference marker provides a reference to the heading select mode of the autopilot.

The CRS set knob provides the means for selecting any one of 360 courses. To select a desired course, rotate the head of the course arrow to the desired course on the compass card and check the course selector window for the precise setting. Once set, the course arrow rotates with the compass card.

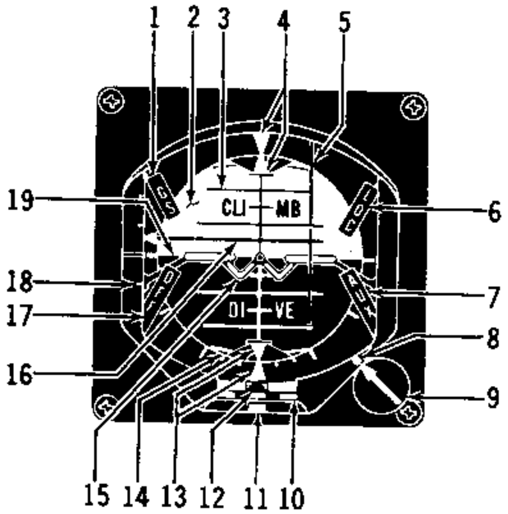
The bearing pointer provides bearing information to TACAN station or INS destination. Refer to figure 1-57.

The range indicator provides a readout of distance in NM to a TACAN station, DME navigational aid, or INS destination. Loss of TACAN or DME signal or an unreliable signal will cause a warning flag to cover the range indication window when either ILS/TCN or TCN mode is selected. When NAV or ILS/NAV is selected, an incorrect signal will cause the warning flag to cover the range indication window. Loss of power to the HSI may cause the OFF warning flag to come into view.

CLOCK

The clock (figure 1-59), located on the right auxiliary console, is an 8-day, manually wound clock with provisions for an elapsed time indication up to 60 minutes.

Attitude Director Indicator (ADI)

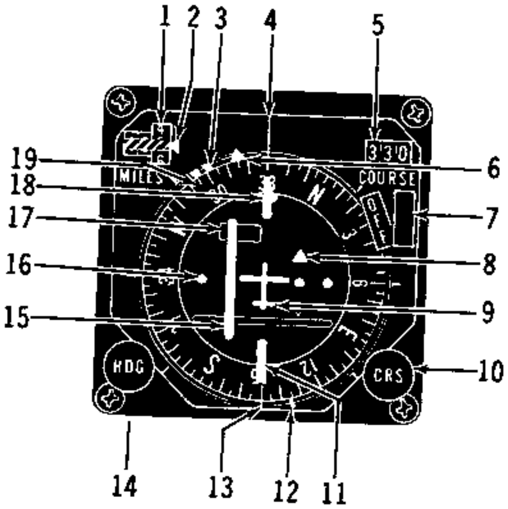


1. GS Flag — Glide Slope Unreliable
2. Attitude Sphere
3. Pitch Scale
4. Upper Bank Index Pointer
5. Localizer Deviation Bar
6. LOC Flag — Localizer Signal Unreliable
7. AUX Flag — INS Computer Unreliable
8. Pitch Trim Index
9. Pitch Trim Knob
10. Rate-of-Turn Scale
11. Rate-of-Turn Needle
12. Slip Indicator (Ball)
13. Lower Bank Index Pointer
14. Lower Bank Scale
15. Miniature Aircraft
16. Glide Slope Deviation Bar and Pointer
17. OFF Flag — Attitude Sphere Unreliable
18. Glide Slope Deviation Scale
19. Horizon Line

1F-16X-1-0045

Figure 1-60.

Horizontal Situation Indicator (HSI)



1. Range Indicator
2. Warning Flag — Range
3. Heading Reference Marker
4. Upper Lubber Line
5. Course Selector Window
6. Bearing Pointer
7. OFF Warning Flag — HSI Power
8. TO-FROM Indicator
9. Miniature Aircraft
10. CRS Set Knob
11. Course Arrow Tail
12. Bearing Pointer Tail
13. Lower Lubber Line
14. HDG Set Knob
15. Course Deviation Indicator
16. Course Deviation Scale
17. Warning Flag — Course Deviation
18. Course Arrow
19. Compass Card

1F-16X-1-0046

Figure 1-61.

F-16B AIRCRAFT

Only those items which are different, significant, or unique to the forward or rear cockpit are discussed in the following paragraphs.

ENGINE CONTROLS [BR]

Only a throttle, BUC switch, and FUEL MASTER switch are provided.

Throttle [BR]

The throttle is limited in certain functions:

- Cannot be advanced from OFF to IDLE.
- Cannot be advanced from MIL to MAX AB.
- Cannot be retarded from IDLE to OFF.
- Does not have a throttle friction control.

BUC Switch [BR]

The BUC switch (figure 1-4), located on the left console, is a two-position switch.

Functions are:

- BUC – Turns EEC off (35 EEC caution light illuminates) and transfers to BUC regardless of forward cockpit EEC BUC switch position.

- OFF – (Guarded position) Returns control to forward switch position.

FUEL SYSTEM

Fuel Control Panel [BR]

The fuel control panel (figure 1-9), located on the left console, contains a guarded FUEL MASTER switch. The FUEL MASTER switches in both cockpits must be in the MASTER (on) position to permit fuel flow to the engine. Either switch when positioned to OFF will shut off all fuel flow to the engine.

SPEEDBRAKE SYSTEM [BR]

SPD BRK switch is spring-loaded to the off (center) position and must be held during actuation in either the open (aft) position or close (forward) position.

LANDING GEAR (LG) SYSTEM [BR]

The DN LOCK REL button is an electrical redundancy for the LG handle down permission button. All other LG functions are duplicated (figure 1-20) except for the brake channel switch, antiskid and landing/taxi light switches, and a manual downlock release.

FLIGHT CONTROL SYSTEM [BR]

The flight controls are abbreviated and contain only the stick, rudder pedals, and warning, caution, and status lights. The FLCP and manual trim panels are not available.

STICK SELECTOR OPERATION

The stick selector, in either FWD or AFT position, controls the pitch and roll commands of the stick and rudder pedals. Simultaneous input command signals are added together to position the flight control surfaces accordingly. With the stick selector switch in the FWD position, the stick selector indicator will display the word FWD. Depressing the paddle switch of the forward cockpit stick will lock out the rear cockpit stick, rudder, and MPO commands. The OVRD light in both cockpits will light, indicating override has been activated. Depressing the paddle switch of the rear cockpit stick will have no effect on the forward cockpit controls.

With the stick switch in the AFT position, the stick indicator will display the word AFT. Depressing the paddle switch of the rear cockpit stick will lock out the forward cockpit stick, rudder, and MPO commands and will transfer control of NWS to the rear cockpit. The OVRD light in both cockpits will light, indicating override has been activated. Depressing the paddle switch of the forward cockpit stick will have no effect on the rear cockpit controls.

Stick Selector Switch [BF]

The stick selector switch (figure 1-6) is located on the test switch panel.

Functions are:

- FWD – The aft cockpit flight control functions are locked out as long as the paddle switch is held depressed.

- AFT – The forward cockpit flight control functions are locked out, and NWS control is transferred to the rear cockpit as long as the paddle switch is held depressed.

Stick Indicator [BR]

The stick indicator (figure 1-62), located on the instrument panel, indicates the position of the stick selector switch by displaying the word AFT or FWD as applicable.

Stick Override Light [B]

The stick override light (figure 1-62), located on the forward and rear cockpit instrument panels, lights and displays OVRD when the paddle switch has been used to take control.

ESCAPE SYSTEM [B]

Ejection Mode Select Handle [BR]

The EJECTION MODE SEL handle (figure 1-39) is located on the right auxiliary console.

Stick Indicator and Override Light [B] (Typical)

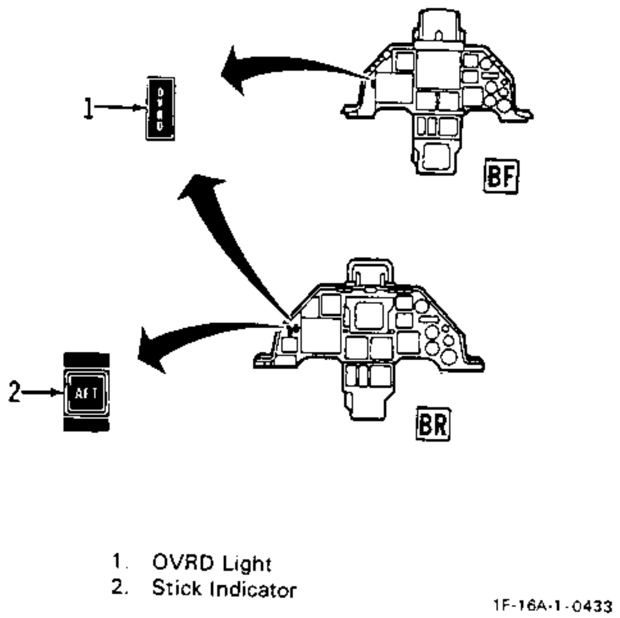


Figure 1-62.

Functions are:

- NORM – Activation of ejection system from rear cockpit results in only rear seat being ejected.

  Activation of ejection system from forward cockpit after rear seat ejection will result in forward seat ejection.

  Activation of ejection system from forward cockpit results in both seats being ejected in aft/forward sequence.
- AFT – Activation of ejection system from either cockpit results in both seats being ejected in aft/forward sequence.
- SOLO – Activation of ejection system from either cockpit results in only that seat being ejected.

COMMUNICATIONS SYSTEM [B]

Control panels for the UHF, TACAN, ILS, and (46) VHF and control indicators/pushbuttons are located in both cockpits. Refer to figures 1-63 and 1-64.

When power is first applied to the aircraft, the forward cockpit control indicators/ pushbuttons illuminate to indicate that the UHF, TACAN, ILS, and (46) VHF are controlled by the forward cockpit control panels. Control can be taken from, but not given to, the other cockpit. When an indicator/pushbutton is not illuminated and control is desired, depress the indicator/pushbutton.

INSTRUMENT MODE SELECT PANEL [BR]

The instrument mode select panel does not have a heading set knob (figure 1-56).

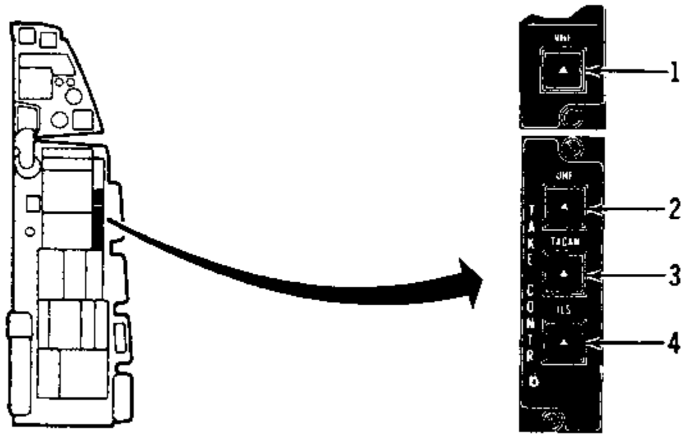
FLIGHT INSTRUMENTS [BR]

An accelerometer is installed and the altimeter barometric pressure set knob is not connected to the CADC.

Accelerometer [BR]

The accelerometer (figure 1-65) is self-contained and mechanically indicates acceleration acting along the vertical axis of the aircraft. The accelerometer is graduated in g units and has three indicating pointers. The main pointer displays instantaneous changes in acceleration. The positive and negative auxiliary pointers indicate the maximum positive and negative acceleration experienced.

Radio Control Panel (Typical) BF



1. **BLOCK 15** VHF Button
2. UHF Button
3. TACAN Button
4. ILS Button

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Figure 1-63.

RADIO CONTROL PANEL BF (Refer to figure 1-63)

CONTROL	POSITION/INDICATION	FUNCTION
1. Block 15 VHF Button	Depressed (lighted)	VHF radio control in forward cockpit
	Unlighted	VHF radio control in rear cockpit
2. UHF Button	Depressed (lighted)	UHF radio control in forward cockpit
	Unlighted	UHF radio control in rear cockpit
3. TACAN Button	Depressed (lighted)	TACAN control in forward cockpit
	Unlighted	TACAN control in rear cockpit
4. ILS Button	Depressed (lighted)	ILS control in forward cockpit
	Unlighted	ILS control in rear cockpit

Radio Select Panel BR (Typical)

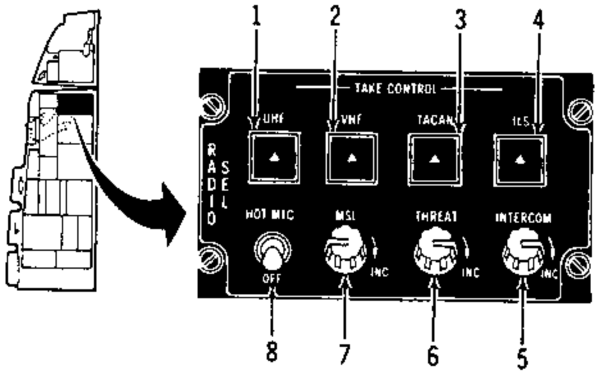


Figure 1-64.

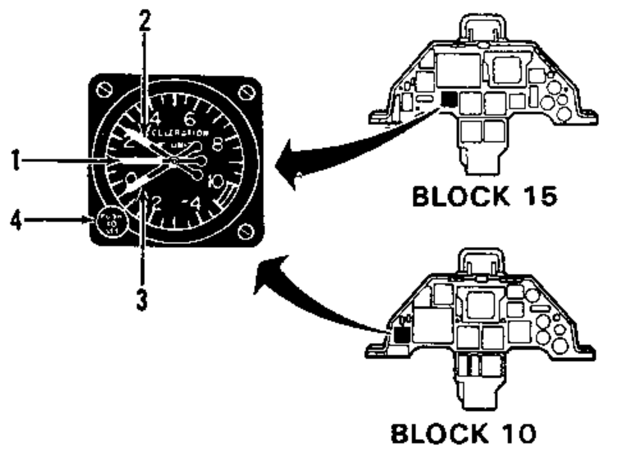
RADIO SELECT PANEL BR (Refer to figure 1-64)

CONTROL	POSITION/INDICATION	FUNCTION
1. UHF Button	Depressed (lighted)	UHF radio control in rear cockpit
	Unlighted	UHF radio control in forward cockpit
2. Block 15 VHF Button	Depressed (lighted)	VHF radio control in rear cockpit
	Unlighted	VHF radio control in forward cockpit
3. TACAN Button	Depressed (lighted)	TACAN control in rear cockpit
	Unlighted	TACAN control in forward cockpit

RADIO SELECT PANEL [BR] - Continued

CONTROL	POSITION/INDICATION	FUNCTION
4. ILS Button	Depressed (lighted)	ILS control in rear cockpit
	Unlighted	ILS control in forward cockpit
5. INTERCOM Knob	Controls rear cockpit intercom volume	
6. THREAT Tone Knob	Controls volume of rear cockpit TWS composite threat tone	
7. MSL Tone Knob	Controls volume of rear cockpit tone from the AIM-9 missile being monitored	
8. HOT MIC Switch	OFF	Interphone not activated
	HOT MIC	Provides a rear cockpit microphone for cockpit, ground crew, and AR. Activation of UHF VHF microphone switch overrides the HOT MIC function

Accelerometer [BR] (Typical)



1. Main Pointer
2. Auxiliary Positive Pointer
3. Auxiliary Negative Pointer
4. PUSH TO SET Knob

1F-16V-1-0050

Figure 1-65.

The auxiliary pointers retain their highest readings until the PUSH TO SET knob is depressed.

RADAR/ELECTRO-OPTICAL (REO) DISPLAY [BR]

The HUD CTVS video signal is selectable for display on the REO.

STORES MANAGEMENT SUBSYSTEM (SMS) [BR]

The SCP (figure FO-3) is a display only. The edge pushbuttons are not functional.

FIRE CONTROL RADAR (FCR) [BR]

Limited radar operation is afforded. Refer to figure 1-66 and T.O. 1F-16A-34-1-1.

THROTTLE AND STICK SWITCHES/CONTROLS [BR]

Refer to figure 1-66 for the switches/controls located on the throttle and stick.

ARMAMENT CONSENT SWITCH [BR]

The ARMT CONSENT switch (figure FO-3) is located on the instrument panel and guarded in the ARMT CONSENT position. The switch is in series with the MASTER ARM switch in the forward cockpit and must be in the ARMT CONSENT position to enable the normal release of any store.

Throttle and Stick Switches/Controls BR

BLOCK 10

SWITCH/CONTROL	STATUS
THROTTLE	
DOG FIGHT/Missile Override	Dead/Dead
SPD BRK	Active
RDR CURSOR/ENABLE	Active/Active
*ANT ELV	Active
MAN RNG/UNCAGE	Dead/Dead
UHF/VHF	Active/Active
STICK	
TRIM	Active
CAMERA/GUN	Dead/Dead
WPN REL	Active
*DESIG/RET SRCH	Active/Active
NWS/A/R DISC	Active/Active
MSL STEP	Dead
Paddle	Active

*Control gained by activation of RDR CURSOR/ENABLE switch

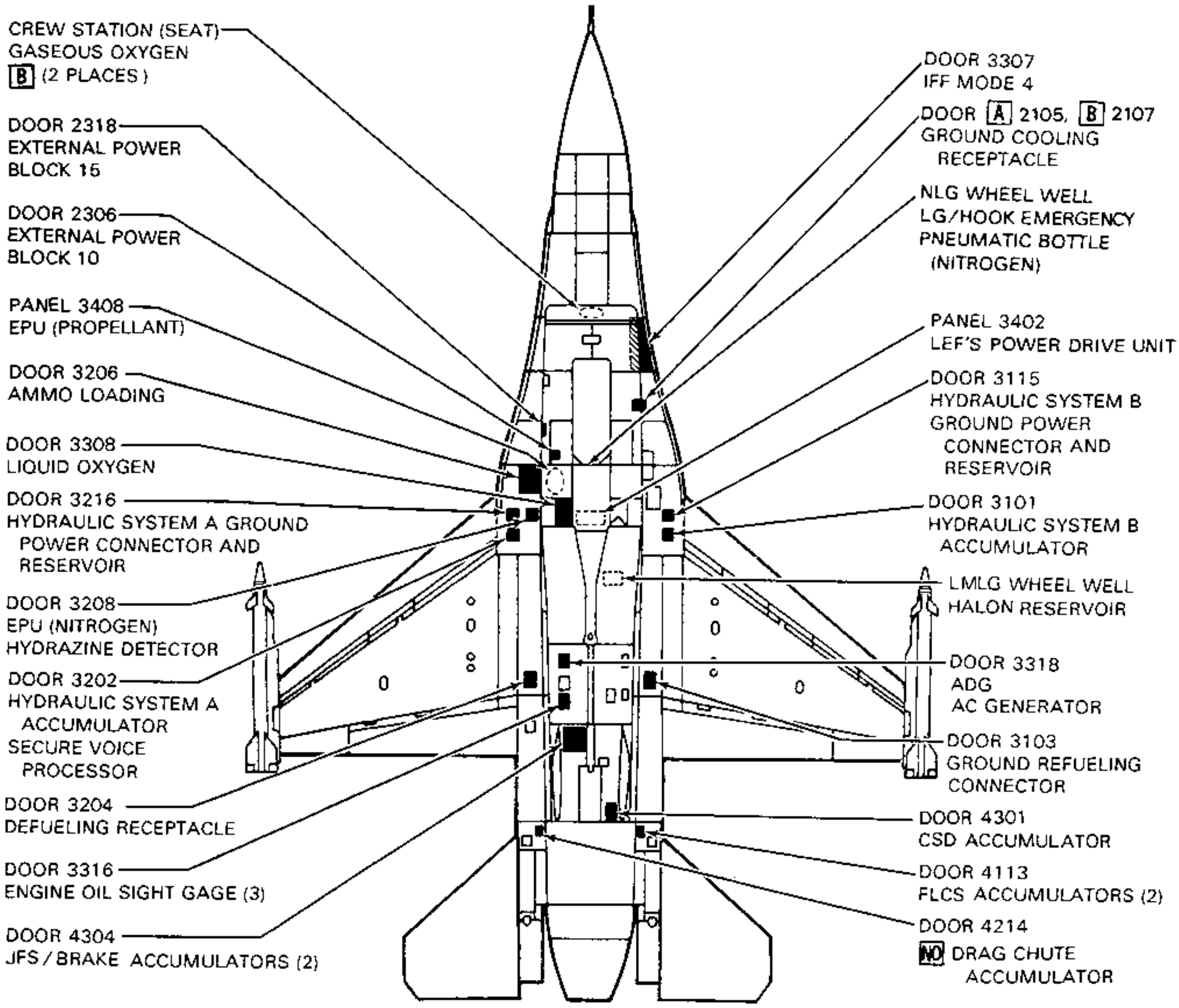
BLOCK 15

SWITCH/CONTROL	STATUS
THROTTLE	
DOG FIGHT/Missile Override	Dead/Dead
SPD BRK	Active
*RDR CURSOR/ENABLE	Active/Active
*ANT ELV	Active
*MAN RNG/UNCAGE	Active/Active
UHF/VHF	Active/Active
STICK	
TRIM	Active
CAMERA/GUN	Active/Dead
WPN REL	Active
*DSG/RS	Active/Active
DO	Dead
DS	Active (only to gain control of *functions)
NWS/A/R DISC	Active/Active
MSL STEP	Dead
Paddle	Active

*Control gained by activation of DS switch

Figure 1-66.

Servicing Diagram (Typical)



SPECIFICATIONS		USAF	NATO
FUEL	PRIMARY	MIL-T-5624, JP-4	F-40
	ALTERNATE (REFER TO SECTION V)	MIL-T-5624, JP-5 MIL-T-83133, JP-8 JET A-1 (COMMERCIAL) JET B (COMMERCIAL)	F-43/44 F-34 F-35
OIL	ENGINE/ADG	MIL-L-7808	0-148
HYDRAULIC FLUID		MIL-H-5606	H-515
OXYGEN	LIQUID	MIL-O-27210, TYPE II	NONE
	GASEOUS	MIL-O-27210, TYPE I	
EXT ELECTRICAL POWER	115 (±15) VAC, 400 (±30) Hz	A/M32A-60A	NONE
NITROGEN	GASEOUS	BB-N-411a, TYPE I, GRADE B	NONE
FUEL TANK INERTING AGENT	LIQUID	HALON 1301	NONE
MONOPROPELLANT EPU	LIQUID	HYDRAZINE (N2H4) 70-30%	NONE

Figure 1-67.

SECTION II

NORMAL PROCEDURES

TABLE OF CONTENTS

INTRODUCTION

This section provides the actions required for normal operation of the aircraft. Amplification is included only when special considerations or techniques should be observed. A complete knowledge of Section III, EMERGENCY PROCEDURES, and Section V, OPERATING LIMITATIONS, is required prior to flight.

FLIGHT PLANNING

Refer to Appendix 1, Performance Data, and T.O. 1F-16A-1-1.

TAKEOFF AND LANDING DATA CARD

If the takeoff distance exceeds one-half the available runway, the takeoff and landing data card in the Flight Crew Checklist should be completed.

COCKPIT DESIGNATION CODE

An asterisk (*) preceding steps is used to highlight procedures for B aircraft which apply to both cockpits.

WEIGHT AND BALANCE

For maximum GW limitations, refer to Section V, OPERATING LIMITATIONS. For weight and balance information, refer to DD Form 365-4 for each individual aircraft and T.O. 1-1B-40.

PREFLIGHT CHECK

Check AFTO Form 781 for aircraft release and stores status.

EXTERIOR INSPECTION

Refer to figure 2-5 for normal preflight inspection.

COCKPIT ACCESS

Refer to figure 2-1 for cockpit access procedures.

BEFORE ENTERING COCKPIT

*1. Ejection seat – Check.

- Ejection safety lever – Safe (Up).
- Safety pins (2) – Removed (Ejection safety lever and RESTRAINT EMERGENCY RELEASE handle).
- RESTRAINT EMERGENCY RELEASE handle – Down.
- Survival kit deployment switch – Auto.
- US BE DE NE Emergency locator beacon – As desired.
- Emergency oxygen bottle – 1800 psi minimum.

Cockpit Access (Typical)

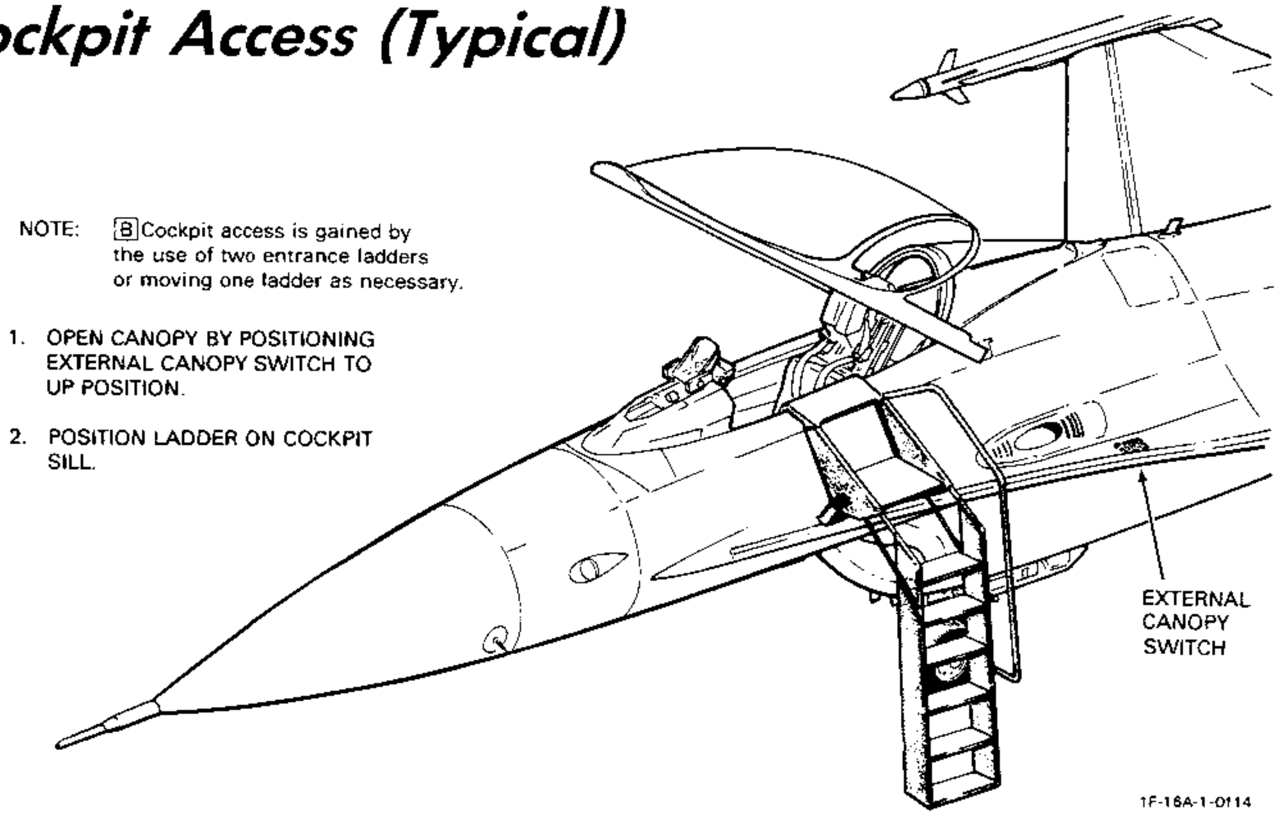


Figure 2-1.

- Quick-disconnect (left side) – Connected.
- Recovery parachute – Free from damage and grease.
- Emergency oxygen hose quick-disconnect – Connected.
- Environmental sensor pitot tubes – Clear of obstructions.
- Quick-disconnect (right side) – Connected.
- Electronic recovery sequencer battery indicator – White indication.
- CANOPY JETTISON T-handle – Secure, safety pin removed.
- Lapbelts – Secure (Pull up and forward, both sides).
- Survival kit straps – Secure (Pull up and aft, both sides).

2. MAIN PWR switch – OFF.
3. Chaff/flare programmer – Check.

BR For solo flight:

4. Ejection seat – Safe, straps secure, pins removed.
5. CANOPY JETTISON T-handle – Secure, safety pin removed.
6. SPD BRK switch – Center.
7. BUC switch – OFF (Guard down).
8. FUEL MASTER switch – MASTER (Guard down).
9. ALT GEAR handle – In.
10. ALT FLAPS switch – NORM.
11. GND JETT ENABLE switch – OFF.
12. HOOK switch – UP.
13. ARMT CONSENT switch – ARMT CONSENT (Guard down).

14. EJECTION MODE SEL handle – SOLO.

15. INTERIOR LIGHT control panel – All knobs off.

COCKPIT INTERIOR CHECK

This checklist is based on a Block 10 configuration but it may be used for any Block configuration. The checklist steps are not arranged in a mandatory order.

*1. Loose or foreign objects – Check.
A thorough cockpit interior preflight check shall be accomplished prior to each flight with emphasis on loose or foreign objects that might cause injury to personnel or damage to the aircraft.

*2. Harness and personal equipment – Fasten.
Attach the parachute risers to the harness. Attach and adjust survival kit straps. Secure and adjust the lapbelt. After fastening lapbelt, hold right side of lapbelt buckle stationary and shake and push left side. Also insure that squeeze bar has reset back to its original position and is flush with buckle to insure a positive lock. Connect oxygen, G-suit, and communication leads. Check operation of the shoulder harness locking mechanism.

WARNING

- The combination of a new style torso harness quick-release fitting (which has a mirrored strip and an orange decal inside the fitting) and an old style parachute riser link (which has the unused swivel elbow) is not authorized since it may separate during ejection.
- A partially locked lapbelt may open during maneuvering flight or ejection sequence.
- Unobserved anti-g suit hose disconnects can contribute to gray/blackout or loss of consciousness. The incapacitation which follows a loss of consciousness (which may not be preceded by gray/blackout) will typically last 10-20 seconds after g-forces subside.

CAUTION

Do not adjust seat height with survival kit straps or lapbelt disconnected as damage to the ejection seat may occur.

NOTE

- The recommended routing of the anti-g suit hose (figure 2-8) is directly under the torso harness and aft of the survival kit strap to reduce the possibility of an anti-g hose disconnect. Anti-g suit hose routing must provide sufficient slack to allow for maximum mobility since in-flight reconnect is extremely difficult.
- Excess anti-g suit hose must be properly routed to prevent manual trim panel interference during flight.

*3. Rudder pedals – Adjust.
Adjust rudder pedals so that legs are flat on the seat cushion to prevent leg from hitting stick.

Left Console

1. PROBE HEAT switch – OFF.
2. BF STICK CONTROL switch – As briefed.
3. 66 FLCS PWR TEST switch – NORM.
4. DEFOG lever – Midrange.
5. SERVO arm switches (3) – Off.
6. SELF TEST switch – OFF.
7. LE FLAPS switch – AUTO.

*8. ALT FLAPS switch – NORM.

9. ECM knobs – OFF (2).

*10. VIDEO SEL switch – As desired.

*11. FUEL MASTER switch – MASTER (Guard down).

12. TANK INERTING switch – OFF.
13. ENG FEED knob – NORM.

14. AIR REFUEL switch – CLOSE.

*15. Communications control panel – As desired.

*16. TACAN – As desired.

17. TRIM/AP DISC switch – NORM.

18. ROLL, YAW, PITCH trim wheels – Center.

19. EPU switch – NORM.

20. MAIN PWR switch – OFF.

21. FCC PWR and INS PWR – On.

22. DIR AIM, OAP 1, OAP 2 – Depress (As desired).

23. FCNP FUNCTION knob – OFF.

24. STARTING FUEL switch – AUTO LEAN.

25. EEC BUC switch – EEC.

26. BR BUC switch – OFF (Guard down).

27. JFS switch – OFF.

*28. UHF function knob – BOTH.

*29. UHF SQUELCH switch – ON.

30. Radar – OFF.

31. Throttle – OFF.

*32. SPD BRK switch – Forward.

*33. DOG FIGHT switch – Center.

Left Auxiliary Console

1. IFF – STBY.

*2. ALT GEAR handle – In.

3. STORES CONFIG switch – As required.

4. LANDING TAXI LIGHTS switch – OFF.

*5. GND JETT ENABLE switch – OFF.

6. BRAKES channel switch – CHAN 1.

7. ANTI-SKID switch – ANTI-SKID.

*8. EMER STORES JETTISON button – Cover intact.

*9. HOOK switch – UP.

WARNING

If either HOOK switch is in DN position, the hook will extend when aircraft battery power is applied.

*10. LG handle – DN.

Instrument Panel

1. AUTOPILOT switch – OFF.

2. ROLL switch – ATT HOLD.

3. PITCH switch – As desired.

4. MASTER ARM switch – OFF.

5. BR ARMT CONSENT switch – ARMT CONSENT (Guard down).

6. LESS 46 SMS PWR switch – As required.

7. 46 LASER ARM switch – OFF.

*8. NO DRAG CHUTE switch – NORM.

9. HUD – Set.

*10. INSTR MODE knob – As desired.

*11. REO knobs – As required.

*12. Altimeter – Set.

Right Auxiliary Console

*1. Clock – Set.

2. FUEL QTY SEL knob – NORM.

3. EXT FUEL TRANS switch – NORM.

NOTE

- Do not use WING FIRST position on the ground. If the transfer valve fails, fuel will overflow onto the ground from the overboard vent line on the left wing outboard of the fuel pylon.
- Do not select WING FIRST position for fuel transfer if the aircraft is configured with both 300-/370-gallon fuel tanks.

4. BR EJECTION MODE SEL handle – NORM or AFT (As briefed).

Right Console

*1. US DE NO ILS – As desired.

2. VHF function knob – TR.

3. VHF mode knob – As desired.

4. NUCLEAR CONSENT switch – OFF (Guard down).

5. 46 MASTER ZEROIZE switch – OFF

*6. Wristrest – As desired.

WARNING

Insure that stick operation is not restricted by the wristrest in the deployed position. If interference is noted, stow the wristrest and inform maintenance.

*7. Interior lighting panel – As desired.

*8. 46 SNSR PWR switches (3) – As required.

9. Exterior lighting panel – As required.

10. MASTER light switch – NORM.

11. TEMP knob – AUTO.

12. AIR SOURCE knob – NORM.

CAUTION

If AIR SOURCE knob is in OFF or RAM, electronic equipment may be damaged.

13. Secure voice POWER switch (if installed) – OFF.

14. 46 AVIONICS POWER switches (5) – As required.

15. CHAFF/FLARE switches (4) – OFF.

16. ANTI-ICE switch – AUTO/ON.

WARNING

If engine anti-ice is on or has been on during ground operation, heat in the inlet strut may be sufficient to cause injury if touched.

CAUTION

If the pavement is wet or standing water is present and ambient temperature is 45°F (7°C) or less, place the ANTI-ICE switch to ON.

17. IFF switch – NORM.

18. UHF switch – NORM.

*19. Oxygen system – Check.

- PRESSURE – Check 50-120 psi.
- SUPPLY lever – ON.
- Diluter lever – NORMAL OXYGEN.
- EMERGENCY lever – NORMAL.
- FLOW indicator – Check.
- EMERGENCY lever – EMERGENCY. Check for positive oxygen pressure.

- EMERGENCY lever – TEST MASK.
  Check for mask and hose/connector leakage.

- EMERGENCY lever – NORMAL.

AFTER COCKPIT CHECK IS COMPLETE – VERIFY

The following items are those important switches that, if not correctly positioned, could cause a safety hazard and/or improperly operated systems during engine start.

*1. FUEL MASTER switch – MASTER (Guard down).

2. ENG FEED knob – NORM.

3. EPU switch – NORM.

4. STARTING FUEL switch – AUTO LEAN.

5. EEC BUC switch – EEC.

NOTE

The EEC BUC switch can be in OFF with the guard down.

6. BR BUC switch – OFF (Guard down).

*7. Throttle – OFF.

8. BRAKES channel switch – CHAN 1.

*9. HOOK switch – UP.

*10. LG handle – DN.

11. MASTER ARM switch – OFF.

12. AIR SOURCE knob – NORM.

BEFORE STARTING ENGINE

1. 66 MAIN PWR switch – BATT.

2. 66 Aircraft battery power to FLCS inverters – Check.
   With the MAIN PWR switch in BATT, confirm ACFT BATT TO FLCS and four FLCS PWR lights on. The following additional lights will be on: ELEC SYS, FLCS PMG, and MAIN GEN.

3. 66 FLCS PWR TEST switch – TEST and hold.
   Activation of the FLCS PWR TEST switch with the MAIN PWR switch in BATT will check that the FLCS batteries are discharging and that inverter output is good. Verify that the four FLCS BATT and FLCS PWR lights are on. The ACFT BATT TO FLCS and FLCS PMG lights should go off when the FLCS PWR TEST switch is in TEST.

4. MAIN PWR switch – MAIN PWR.

CAUTION

Do not apply external electrical power for more than 5 minutes without cooling air; longer operation may damage electronic components which cannot be turned off. Prior to applying external power without cooling air, insure that all avionics equipment is off; UHF/VHF radio operation is permissible.

NOTE

- Activation of the toe brakes with the MAIN PWR switch out of OFF will deplete the brake/JFS accumulators.

- The FLT CONT SYS, ELEC SYS, and BUC caution lights should be on. If these lights are not on, notify maintenance.

5. 66 EPU GEN and EPU PMG (LESS 66 GEN EMER) lights – Confirm off.

WARNING

If the light(s) is illuminated, turn the MAIN PWR switch to OFF. Insure that the EPU safety pin remains installed and notify maintenance.

6. Communications – Established.

7. Canopy – As desired.

CAUTION

- To prevent possible engine damage, stow or secure loose cockpit items prior to engine start with the canopy not closed.

- When lowering or raising the canopy handle, insure that the canopy switch is not bumped to the up (open) position before handle is completely locked or unlocked. If this occurs, hold the switch in the down (close) position as soon as possible to relieve the jammed condition and prevent actuator burnout. If required, manually crank canopy toward the closed position to relieve the jammed condition.

8. Chocks in place, fire guard posted, and intake and other danger areas clear.

STARTING ENGINE

During normal start, the JFS RUN light will come on within 30 seconds after moving the switch to START 1 or START 2. After the JFS RUN light comes on, rpm increases smoothly to approximately 25 percent. The BUC caution light will go off shortly after rpm rise. Light-off is indicated by an ignition vibration and an increase in rpm followed by an increase in FTIT. Light-off will occur within 15 seconds after moving the throttle to IDLE with smooth acceleration to UFC idle. Without external power connected, only the rpm and FTIT indicators will function. At approximately 45 percent, the main generator will come on the line, all electrical system lights will go off, and at 50 percent, the JFS will shut off. The EEC will trim to idle rpm within approximately 1 minute. The throttle should not be moved until idle rpm is reached. FTIT increases smoothly at a moderate rate and normally peaks at less than 575°C. Refer to figure 2-6 for danger areas.

1. JFS switch – START 1 or 2.
   Refer to figure 5-5 for temperature conditions when START 2 is required.

2. BUC caution light – Check off during rpm rise.

3. Throttle – Advance to IDLE at 15 percent rpm.

CAUTION

If the engine has been run more than 30 minutes ago and less than 3-1/2 hours ago, do not advance the throttle to IDLE until 40 seconds after the JFS RUN light comes on. The time the JFS RUN light was on during previous start attempts is cumulative toward the 40 seconds.

NOTE

- 57 If more than 30 seconds elapse from movement of the MAIN PWR switch out of OFF until both hydraulic pressures are above 1000 psi and the HYD/OIL PRESS light goes off prior to approximately 25 percent rpm, suspect failure of the engine oil pressure sensor and abort the aircraft. If less than 30 seconds elapse from movement of the MAIN PWR switch out of OFF until both hydraulic pressures are above 1000 psi, the HYD/OIL PRESS light check is not valid.

- LESS 57 If the HYD/OIL PRESS light goes off prior to approximately 25 percent rpm, suspect failure of the engine oil pressure sensor and abort the aircraft.

- If the main generator fails to come on the line automatically during engine start, do not attempt reset. Although the generator may reset, a problem may still exist. Notify maintenance.

4. JFS switch – Confirm OFF (50 percent rpm).

CAUTION

- 80 If JFS switch does not automatically return to OFF, turn JFS off and notify maintenance.

- LESS 80 If JFS switch does not automatically return to OFF, the BUC may engage immediately when the EEC BUC switch is positioned to BUC. Turn JFS off and notify maintenance.

*Engine at idle and check:

5. HYD/OIL PRESS light – Off.
   The HYD/OIL PRESS light may not go off until rpm is increased to 70 percent. If the light comes on again at IDLE, notify maintenance.

6. Fuel flow – 500-1500 pph.

7. RPM – 60-70 percent.

8. FTIT – 575°C or less.

9. OIL pressure – 15 psi (minimum).

CAUTION

If no oil pressure is indicated within 1 minute of light-off, abort the start.

10. NOZ POS – Open 70-95 percent.

11. HYD PRESS A & B – 2850-3250 psi.

12. Six fuel pump lights (ground crew) – On.

NOTE

FFP light may blink at idle rpm.

13. JFS doors (ground crew) – Verify closed.

AFTER ENGINE START

1. Test switch panel – Test.

   • FIRE & OHEAT DETECT button – Test.

   • MAL & IND LTS button – Test.

NOTE

57 Proper VWCS operation is verified by the presence of both a warning and a caution voice message and the LG warning tone. Variations in the sequence and time delays of the voice message are acceptable on the ground test only.

   • OXY QTY test switch – Test and check.

2. INS – Align.

3. MFL – Clear.

4. UFC/BUC – Check.
   May be delayed until the BEFORE TAKEOFF check to avoid high thrust with associated high exhaust velocities in congested areas.

NOTE

To preclude degrading the INS alignment, complete the UFC/BUC check within 4.5 minutes after starting the alignment or defer check until alignment is complete.

• Throttle – IDLE.

• EEC BUC switch – OFF.

  · Nozzle closes to 5-20 percent.

  · FTIT increases approximately 30°C.

  · RPM decreases to UFC idle.

  · EEC caution light – On.

• Throttle – Increase up to 70 percent rpm as conditions permit.

NOTE

Unless local circumstances dictate a lower thrust setting, approximately 70 percent rpm should be used to reduce the possibility of a flameout if transfer occurs immediately.

• EEC BUC switch – BUC.

  · BUC IDLE detent drops in place (audible click).

CAUTION

If an immediate transfer to BUC occurs when BUC is selected, the rpm will decrease rapidly and the engine may stagnate if the throttle is advanced. Should immediate transfer occur, move the throttle to OFF and inform maintenance.

- Throttle – Rotate outboard; advance quickly past the BUC IDLE detent (to approximately midrange); then rotate inboard and retard to BUC IDLE, all in one smooth continuous motion.

CAUTION

Transfer (illuminated BUC caution light) usually occurs within 1-2 seconds after the above throttle manipulation. If transfer does not occur, move the throttle to OFF and inform maintenance. If the engine autoaccelerates during transfer to or when operating in BUC, shut the engine down and have maintenance investigate before further operation.

NOTE

This throttle technique differs from that required during a BUC start.

- BUC caution light – On.
- Throttle – Slowly advance to verify engine accelerates; then return to BUC IDLE.

NOTE

Prior to placing the EEC BUC switch to OFF, insure nozzle is at least 10 percent open to preclude an engine stall when transferring back to UFC. If the nozzle is less than 10 percent open, advance the throttle to 75 percent rpm. This provides additional stall margin during transfer back to UFC.

- EEC BUC switch – OFF.
- Throttle – Retard to IDLE at first indication of rpm increase.
- BUC caution light – Off.

CAUTION

- If the engine fails to transfer back to UFC and the throttle is retarded to IDLE, the engine will probably flameout and may stagnate. If this occurs, shut down the engine. If no other problems are indicated, JFS START 2 can be used to motor the engine until FTIT is below 200°C.
- If the throttle is not retarded immediately after the first indication of rpm increase, the rpm could accelerate to more than 80 percent very quickly.

- EEC BUC switch – EEC.
  - EEC caution light – Off.
  - Nozzle – Opens steadily (70-95 percent).
  - FTIT – Decreases.
  - RPM – Verify EEC idle.

5. FLCS self-test – Initiate and monitor.

NOTE

- 66 The FLCS PWR lights will illuminate individually during FLCS self-test as follows:
  - A light – Steps 1-4.
  - B light – Steps 11-13.
  - C light – Steps 17-19.
  - D light – Steps 23-25.

  The FLCS BATT lights and the ELEC SYS caution light will not illuminate during these steps.
- LESS 66 The FCS DISC light and the ELEC SYS caution light will illuminate during FLCS self-test steps 1-4, 11-13, 17-19, and 23-25.

a. LE FLAPS switch – AUTO.

b. PITCH, ROLL, and YAW trim wheels – Center.

c. FCS CAUTION button and SERVO ELEC RESET switch – Activate SERVO and FCS CAUTION simultaneously and then ELEC momentarily.

NOTE

LESS 52 ADC and LE FLAPS caution lights which do not reset may indicate a halted microprocessor within the ECA. LESS 66 If this occurs, place the EPU switch to OFF and cycle MAIN PWR switch to OFF for 1 second and then back to MAIN PWR.

(1). FLT CONT SYS caution light - Off.

d. SELF TEST switch - TEST.

(1). Test No. indicates 00.

e. ADV SLEW switch - ADV momentarily.

(1). Test No. indicates 00.

(2). MAL light is on.

f. ADV SLEW switch - ADV momentarily twice; hesitate between advances.

(1). STBY GAINS light on in test No. 1.

NOTE

LESS 52 MAL light may illuminate on every test with no FLCC or ECA data word dot light. LESS 66 If this occurs, place the EPU switch to OFF and cycle MAIN PWR switch to OFF for 1 second and then back to MAIN PWR. Reinitiate self-test and position EPU switch as required.

(2). Self-test sequences through test No. 42.

NOTE

LESS 66 If the ELEC SYS caution light illuminates and stays on during FLCS self-test with no associated electrical panel caution lights on, depress ELEC CAUTION RESET button to reset the inverter(s) and reinitiate FLCS self-test.

(3). Program stops.

(4). Test No. indicates 43.

g. ADV SLEW switch - ADV momentarily.

(1). Tests sequence through test No. 47.

(2). Program stops.

(3). Test No. indicates 48.

h. ADV SLEW switch - ADV momentarily.

(1). Test No. advances to 51.

(2). FLT CONT SYS, P, R, Y, and all five SERVO lights - On.

(3). Program stops.

i. FCS CAUTION button and SERVO ELEC RESET switch - Activate SERVO and FCS CAUTION simultaneously and then ELEC momentarily.

j. ADV SLEW switch - ADV momentarily.

(1). Test No. advances to 54.

(2). FLT CONT SYS, P, R, Y, and all five SERVO lights - On.

(3). Program stops.

For expanded FLCS self-test, refer to SUPPLEMENTAL PROCEDURES, this section.

k. FCS CAUTION button and SERVO ELEC RESET switch - Activate SERVO and FCS CAUTION simultaneously and then ELEC momentarily.

l. SELF TEST switch - OFF. End of normal FLCS self-test.

WARNING

- 66 If required to shut down and restart the engine, the FLCS battery test must be reaccomplished prior to start.
- LESS 66 If required to shut down and restart the engine after completing the FLCS self-test, the FLCS self-test must be reaccomplished at least through test No. 43 prior to flight to verify satisfactory status of the FLCS batteries.

NOTE

While the engine is shut down, the aircraft battery continues to power the FLCS with the MAIN PWR switch in BATT or MAIN PWR. Place MAIN PWR switch to OFF to conserve aircraft battery power.

6. ECM knobs – As required.

7. SPD BRK switch – Cycle.

8. Radar – As desired.

9. TWS – As desired.

*10. WHEELS down lights – Three green.

11. SMS – As desired.

CAUTION

When AIM-9's are loaded, the SMS must be on while taxiing or airborne. If recycling of the SMS is required, power should not be off longer than 8 seconds at any one time.

12. HUD – As desired.

*13. REO – As desired.

*14. SAI – Set.

15. FUEL QTY SEL knob – Check.

- TEST – FR, AL pointers indicate 2000 (±100) pounds and totalizer indicates 6000 (±100) pounds. FWD and AFT FUEL LOW caution lights illuminate and remain illuminated 76 for approximately 60 seconds after (LESS 76 until) the knob is moved out of TEST.
- NORM – AL pointer indicates approximately 2800 pounds. FR pointer indicates approximately 3100 ([B] 1800) pounds.
- RSVR – Each reservoir indicates approximately 460 pounds.
- INT WING – Each wing indicates approximately 500 pounds.
- EXT WING – Each external wing tank indicates approximately 2300 pounds (for full tanks).
- EXT CTR – FR pointer indicates approximately 1800 pounds (for full tank). AL pointer drops to zero.

NOTE

The sum of the individual fuel tanks and the totalizer should agree within ±200 pounds with only internal fuel or ±400 pounds with external fuel.

- FUEL QTY SEL knob – As desired.

16. EPU fuel quantity – 95-102 percent.

After FLCS self-test completed:

17. Trim – Check.

NOTE

If the FLCS self-test is turned on, the TEF's will retract allowing observation of trim inputs from the cockpit. Insure FLCS self-test is returned to OFF after trim is checked.

- TRIM/AP DISC switch – DISC.
- Stick trim switch – Actuate in roll and pitch.
  - No control surface motion.
  - No thumbwheel motion.
- TRIM/AP DISC switch – NORM.
  - Stick trim – Check and center.
  - Surface motion.
  - Thumbwheel and indicator motion.
- Rudder trim check.

*18. [B] FLCS override – Check.

- [BF] STICK CONTROL – Selected cockpit.
- [BR] Cockpit stick selector indicator – As selected.

- Selected cockpit paddle switch – Depress.
  - Override lights – On (Both cockpits).
  - Selected cockpit stick – Operative.
  - Other cockpit stick – Inoperative.

*19. MPO – Check.

- Stick – Full forward and hold; note horizontal tail deflection.
- MPO switch – OVRD and hold.
  - Confirm that horizontal tail trailing edges move symmetrically further down.
- Stick and MPO switch – Release.
  - Confirm that the horizontal tail returns to its original position.

*20. Operate controls – All surfaces respond normally; no FLCS lights on.

*21. AR system (if required) – Check.

- AIR REFUEL switch – OPEN, RDY light – On, DISC light – Off.

NOTE

If both the RDY and DISC lights are on, then one or more of the AR/FLCS relays have failed. This condition must be corrected prior to AR.

- [B] A/R DISC button – Depressed. DISC light on, RDY light off; 3 seconds later, RDY light on, DISC light off.
- AIR REFUEL switch – CLOSE, RDY light off.

*22. Brakes – Check.

- One brake pedal – Depress.
  - Confirm (ground crew) – Brake activates.
- Opposite brake pedal – Depress.
  - Confirm (ground crew) – Initial brake does not activate.
- Repeat above steps for opposite brake.

a. (48) BRAKES – Check both channels; then return to CHAN 1.

b. LESS (48) BRAKES – Check in CHAN 1 only.

NOTE

LESS (48) Do not select CHAN 2 on the ground. If the brakes fail, CHAN 1 will not be available.

23. (66) EPU GEN and EPU PMG (LESS (66) GEN EMER) lights – Confirm off.

WARNING

If the light(s) is illuminated, the EPU will activate using hydrazine when the EPU safety pin is removed.

24. Ground safety pins (ground crew) – Remove.

25. Intercom (ground crew) – Disconnect.

26. FCNP – Programmed.

- Destinations – Entered.
- DVAL – As required.

NOTE

System altitude error will result if D-value altitude calibration is accomplished during the first four steps of the FLCS self-test.

- Bingo fuel – Set.

27. Avionics BIT's – As desired.

BEFORE TAXI

1. Canopy – Close and lock.
   The canopy may be partially opened for taxiing if required for increased visibility.

*2. Altimeter – Set and check.
   Check that the reading in ELECT and PNEU is ±75 feet of a known elevation. Check that the modes are within 75 feet of one another.

3. Exterior lights – As required.

4. FCNP FUNCTION knob – NAV.

5. Chocks (ground crew) – Remove.

CAUTION

If the aircraft has flown in the past 2 hours, do not use the parking brake except for an emergency. Parking brake use may cause residual heat damage to brakes and may increase the probability of a subsequent brake fire.

TAXI

Refer to figure 2-7 for turning radius and ground clearance.

*1. Brakes and NWS – Check.

CAUTION

To minimize heat buildup in the brake assemblies, do not ride the brakes to control taxi speed. Use one firm application of the toe brakes to slow the aircraft.

*2. Heading – Check.

*3. Flight instruments – Check for proper operation.

BEFORE TAKEOFF

*1. ALT FLAPS switch – NORM.

2. Trim – Center.

3. STARTING FUEL switch – AUTO LEAN.

4. EEC BUC switch – EEC.

5. BR BUC switch – OFF (Guard down).

6. Speedbrakes – Closed.

7. Canopy – Close, lock, light off.

8. IFF – Check and set.

9. External tanks (if installed) – Verify feeding. If three tanks are installed, verify that the centerline tank is feeding. This checks that pressurization is available to all tanks.

10. STORES CONFIG switch – As required.

*11. GND JETT ENABLE switch – As required.

*12. Harness, leads, and G-suit – Check.

- G-suit – Test.
  Depress TEST button to check that G-suit inflates and hose remains connected.

13. EPU – Check:

NOTE

EPU may be checked either BEFORE TAXI or BEFORE TAKEOFF as per local directives.

- EPU safety pin (ground crew) – Check removed.
- OXYGEN – 100%.
- Engine rpm – Increase 5 percent above normal idle.

CAUTION

Attempting EPU/GEN TEST at idle rpm will result in abnormally low EPU run speed. Low EPU speed may cause electrical bus cycling and possible damage to electrical equipment. Indications may include blinking 66 EPU GEN or LESS 66 GEN EMER light or audible clicking of electrical contactors as the bus cycles. If electrical bus cycling is experienced, abort the aircraft and do not taxi.

- 66 EPU/GEN TEST switch – EPU/GEN and hold. Check lights:
  - EPU air light – On.
  - EPU GEN and EPU PMG lights – Off (May come on momentarily at start of test).
  - FLCS PWR lights – On.

- EPU run light – On for a minimum of 5 seconds.

- LESS 66 EPU/GEN TEST switch – EPU/GEN and hold. Check lights:
  - EPU AIR light – On.
  - GEN EMER light – Off (May come on momentarily at start of test).
  - EPU run light – On for a minimum of 5 seconds.

NOTE

If EPU run light does not come on within 10 seconds after EPU/GEN is selected, release EPU/GEN TEST switch, advance the throttle to idle rpm plus 10 percent, and reselect EPU/GEN. If the EPU run light does not illuminate within 10 seconds or if it cycles on and off, abort the aircraft.

- EPU/GEN TEST switch – OFF.
- Throttle – IDLE.
- Voltage transients may cause fault light indications. Reset EEC, FLT CONT SYS, CADC, and AVIONICS caution lights as necessary.
- OXYGEN – NORMAL.
- EPU exhaust (ground crew) – Check for no airflow.

WARNING

- Airflow is indicative of a failed 13th-stage bleed valve which could result in an EPU overspeed in flight. If airflow is detected, abort the aircraft.
- If required to shut down and restart the engine after completing the EPU check or if the EPU safety pin is reinstalled for any reason, the EPU check must be reaccomplished prior to flight to insure proper EPU operation and closure of the 13th-stage bleed valve.

14. PROBE HEAT switch – PROBE HEAT.

WARNING

If the probe heaters are on or have been on, they may be hot enough to cause serious injury if touched.

CAUTION

Delay turning on probe heat as long as possible prior to takeoff unless actual icing is anticipated.

*15. Ejection safety lever – Arm (Down).

CAUTION

Do not allow ejection safety lever to slam down as this action may cause lever rivet failure and false indication of ejection seat arming status.

*16. Flight controls – Cycle.

*17. Oil pressure – Check psi.

*18. All warning and caution lights – Check.

TAKEOFF

NORMAL TAKEOFF (Figure 2-2)

When ready for takeoff, release brakes prior to 80 percent rpm and advance throttle to MIL or MAX AB as desired. Check engine instruments for normal operation. RPM will stabilize in 5-10 seconds.

WARNING

During AB operation, if the throttle is retarded far enough to shut off the AB (nozzle position less than 20 percent), the throttle should be positioned to MIL for a minimum of 1.5 seconds before reselecting AB. Failure to remain at MIL for at least 1.5 seconds may result in mislight and could cause a compressor stall or stagnation.

47 When airspeed is approximately 10 knots below computed takeoff speed for MIL or 15 knots for MAX AB, initiate rotation to establish takeoff attitude (8-12 degrees). Normally, do not apply aft stick at airspeed lower than 10-15 knots below computed takeoff speed. The aircraft will rotate below these airspeeds. Early rotation can lead to overrotation, skipping, wallowing due to early lift-off, and increased takeoff distance.

Normal Takeoff (Typical)

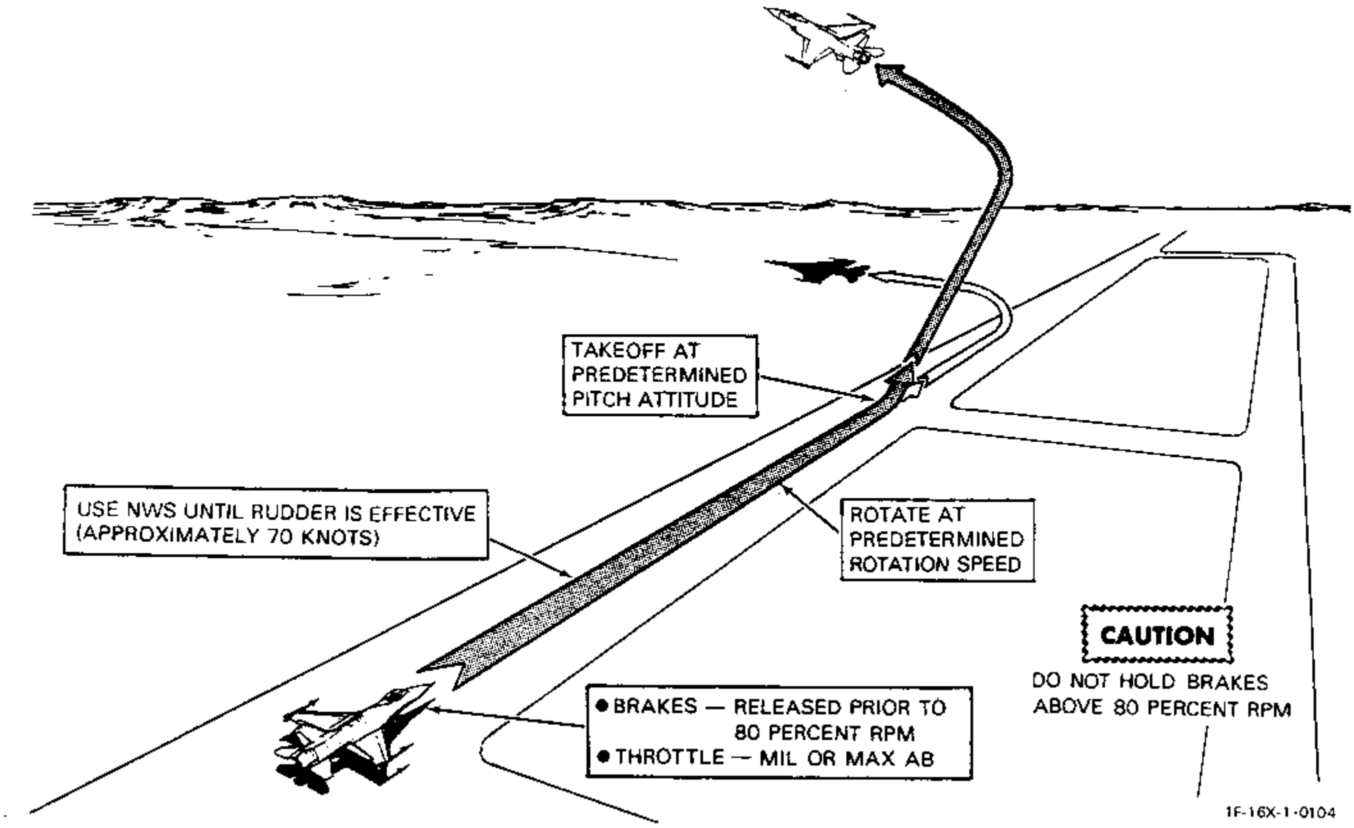


Figure 2-2.

LESS 47 When airspeed is approximately 15 knots below computed takeoff speed, establish takeoff attitude (8-12 degrees).

As aircraft lifts off, LEF's will extend downward. Retract LG when safely airborne. Insure LG is up and locked before exceeding 300 knots. TEF's will retract when the LG handle is raised.

WARNING

Malfunctions in the engine warning light system will not be evident until weight off wheels occurs. The ENGINE warning light may illuminate followed by the voice warning message. Engine instruments should be checked to confirm an actual engine problem prior to initiating the appropriate emergency procedure.

CAUTION

- Since LG and TEF's retraction occurs simultaneously, LG retraction should not be rushed at high density altitudes (hot days and/or high altitude) or with stores.
- 70 Due to low aft stick forces required for takeoff, use caution to avoid early rotation.

NOTE

If any FLCS lights (LE FLAPS, P, R, Y, ADC, or CADC) illuminate during takeoff, a WOW switch problem may be indicated. If the light(s) resets, the mission may be continued; however, use caution during two-point aerodynamic braking on landing since a pitchup may occur. Write up the occurrence after the flight.

NOTE

66 LESS 77 A false voice caution message will activate shortly after weight off wheels if the MAL & IND LTS switch(es) (A and both BF and BR) is placed to DIM. As long as the lights (A, BF, and BR) remain dimmed, caution light illumination will not generate a voice caution message and the MASTER CAUTION light may not be resettable.

TAKEOFF WITH ASYMMETRIC STORES

Roll trim may be set prior to takeoff with asymmetric stores to prevent wing drop. The amount of roll trim required for various asymmetric store weights is shown in Appendix 1, Part 2.

The ARI is cut out for wheel spinup speeds above 60 knots groundspeed. After lift-off, preretraction wheel braking or normal wheelspin slowing will cause the ARI to cut in. Roll trim for asymmetric stores will then lead to a rudder input via the ARI and can cause aircraft yaw away from the wing with the asymmetric store. This yaw is easily controllable by rudder inputs.

CLIMB

The recommended MIL climb schedule to obtain optimum performance for a clean aircraft is 450 knots to 0.88 mach; then maintain 0.88 mach.

CLIMB/IN-FLIGHT/OPERATIONAL CHECKS

At frequent intervals, check the aircraft systems, engine instruments, cockpit pressure, and oxygen flow indicator and system operation. Monitor fuel in each internal and external tank to verify that fuel is transferring properly by rotating the FUEL QTY SEL knob and checking that the sum of the pointers and totalizer agree and that fuel distribution is correct.

NOTE

If AB is used extensively while the external tanks contain fuel, a partial depletion of fuselage fuel prior to full depletion of external tank fuel may occur. This may cause the tanks to appear to be slow to feed and/or may subsequently cause a fuselage fuel imbalance.

1. Fuel – Check quantity/transfer/balance.
2. Oxygen system – Check.
3. Cockpit pressurization – Check.
4. Engine instruments – Check.

AIR REFUELING PROCEDURES

Refer to T.O. 1-1C-1 for general AR procedures and to T.O. 1-1C-1-30 for specific AR procedures.

DESCENT/BEFORE LANDING

1. Fuel – Check quantity/transfer/balance.
2. DEFOG lever/cockpit heat – As required.
3. Landing light – On.
4. Altimeter – Check.
5. Attitude references – Check ADI/HUD/SAI.
6. ANTI-ICE switch – As required.

LANDING

NORMAL LANDING (Figure 2-3)

Fly initial at 300 knots. At the break, retard throttle and open speedbrakes as required. On downwind, when airspeed is below 300 knots, lower the LG. During base turn, reduce airspeed to arrive on final at a maximum of 13 degrees AOA. Check LG down and speedbrakes opened. On final approach, adjust airspeed to maintain 13 degrees AOA maximum. Rate of descent will decrease slightly after entering ground effect. Maintain 13 degrees AOA maximum, retard throttle to continue descent, and reduce sink rate to minimum practical prior to touchdown.

CAUTION

Failure to reduce sink rate, particularly at heavier GW's, may cause a firm landing and structural damage or failure of the LG.

47 Aft CG approaches may be characterized by increased pitch sensitivity which will be most noticeable upon entering ground effect.

CAUTION

Failure to depress the LG handle down permission button prior to attempting to lower the LG may result in damage to the electrical solenoid.

Normal Landing Pattern (Typical)

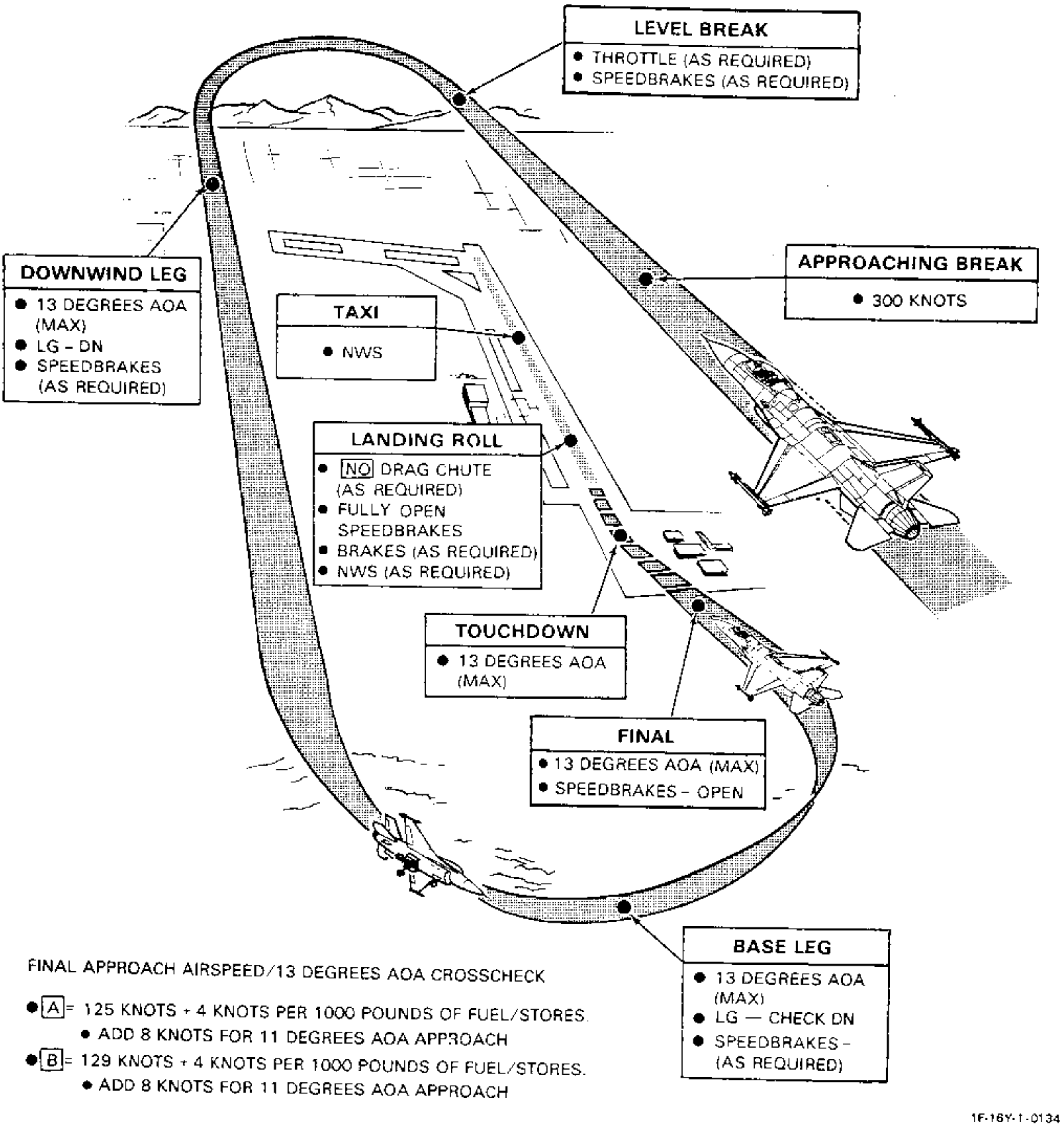


Figure 2-3.

CAUTION

- [B] Use of the paddle switch may cause pitch and/or roll transients as control is switched from one cockpit to the other.
- Avoid landing directly on approach-end arresting cable to prevent possible cable strike damage to nozzle, speedbrakes, and ventral fins.

[NO] Deploy the drag chute (if desired) immediately after touchdown. The nose may pitch up or down when the chute is deployed, but the motion is easily controlled.

NOTE

[NO] To deploy the drag chute after touchdown, lift the guard and switch in one single motion with the side of the index finger.

Use two-point aerodynamic braking until approximately 80 knots; then fly the nosewheel to runway. Maximum effective two-point aerodynamic braking is achieved at 13 degrees AOA. An AOA less than 13 degrees will result in significantly reduced two-point aerodynamic braking. Two-point aerodynamic braking below 80 knots is ineffective and will increase ground roll.

CAUTION

- Do not touch down with brake pedals depressed. A failure in either the touchdown protection circuitry or an MLG WOW switch can result in locked wheels and blown MLG tires.
- Use a maximum of 13 degrees AOA for two-point aerodynamic braking. Nozzle, speedbrakes, and ventral fins may contact runway if 15-degree pitch angle is exceeded.
- During two-point aerodynamic braking, the speedbrakes (43 degrees or greater open) may contact the cable.
- At WOW, the AOA indicator drives to approximately 13.6 degrees and is no longer a valid indication of aircraft attitude.
- If any FLCS lights (LE FLAPS, P, R, Y, ADC, or CADC) illuminate during landing, a WOW switch problem is probably indicated. Use two-point aerodynamic braking with caution since a pitchup may occur. Write up the occurrence after the flight.
- Block 10, LESS 68 or LESS 69 Overrotation may occur with WOW as a result of increased horizontal tail deflection. Heavier GW and aft CG tend to increase probability for AOA overshoot. 70 AOA overshoot potential is increased during two-point aerodynamic braking. Be prepared to counter the noseup transient with forward stick pressure.
- Block 15 with 70, LESS 69 Landing at heavy GW's could result in runway contact due to AOA overshoot when the WOW switches engage during two-point aerodynamic braking. Use normal landing techniques and aerodynamic braking. Anticipate a noseup pitch transient when the WOW switches engage.
- Block 10 with 70, LESS 68, and LESS 69 Landing with 370-gallon tanks plus stores or four large (2000 pounds) stores must be done with caution. Reduce GW as much as possible. Jettison large stores and multiple stores (500-pound class or greater). If jettison is unsuccessful or cannot be accomplished, use caution during two-point aerodynamic braking on landing.

NOTE

Rapid roll inputs or turbulence during landing may cause the T.O./LAND CONFIG warning light to blink for 1/2 second or less and may also cause illumination of multiple flight control lights.

After the nosewheel is on the runway, open the speedbrakes fully and maintain full aft stick for maximum three-point aerodynamic braking and wheel braking effectiveness. The aircraft may tend to drift right. Forward stick will decrease wheel braking effectiveness.

CAUTION

- Crossing an arresting cable in a three-point attitude above 90 knots groundspeed with a centerline store may cause cable strike.
- Do not move SPD BRK switch to open until the nosewheel is on runway as speedbrakes may contact runway.
- Until WOW, forward stick pressure in excess of approximately 2 pounds will result in full horizontal tail trailing edge down. This horizontal tail deflection will reduce wheel braking effectiveness for stopping and directional control. At high speeds in the three-point attitude, forward stick will result in excessive loads on the NLG which can lead to nose tire failure and possibly cause structural failure of the NLG.

Smoothly apply moderate to heavy braking to decelerate to taxi speed. Using less than moderate braking increases the likelihood of a hot brake(s). NWS should be engaged only if required to prevent departure from prepared runway surface.

WARNING

NWS malfunctions may cause an abrupt turn, tire skidding or blowout, and/or departure from the prepared surface.

SHORT FIELD LANDING (DRY RUNWAY)

When stopping distance is critical, a normal approach should be made. Select IDLE at or slightly before touchdown. Touch down as near as possible to the end of the runway at 13 degrees AOA. NO Deploy the drag chute immediately after touchdown. Two-point aerodynamic and wheel braking should be used with the nose held up at 13 degrees AOA until the nose falls. Pitch must be held at 13 degrees AOA if two-point aerodynamic braking is to be effective. Maximum effort braking is achieved by using the wheel brakes in conjunction with two-point aerodynamic braking. When the wheel brakes become effective, the NLG will automatically fall to the runway. This will occur soon after brakes are applied. After the nosewheel is on the runway, maintain full aft stick, open the speedbrakes fully, and use maximum wheel braking (antiskid on).

CROSSWIND LANDING

The recommended technique for landing in a crosswind is to use a wing level crab through touchdown. At touchdown, the ARI will switch out. Undesirable yaw transients may occur if roll control is being input at this time. After touchdown, perform two-point aerodynamic braking using the rudder to maintain aircraft track down the runway and flaperon to prevent wing rise. In crosswinds, the aircraft may drift downwind due to side loads imposed by the crosswinds or travel upwind due to insufficient directional control inputs/availability. As the airspeed decreases, increasing amounts of rudder will be required to maintain track. Maintain two-point aerodynamic braking until approximately 80 knots or until roll or directional control becomes a problem. As the pitch attitude decreases, the nose will tend to align itself with the ground track.

Aft stick and full opened speedbrakes will reduce stopping distance. Apply brakes after nosewheel is on the runway; however, if stopping distance is a factor, refer to SHORT FIELD LANDING, this section. With all LG on the runway, maintain directional control with rudder, differential braking, and NWS if required.

CAUTION

NO Deploying the drag chute during two-point aerodynamic braking with a crosswind may complicate aircraft control.

NO Be prepared to jettison the drag chute during the landing rollout if directional control or downwind drifting becomes a problem.

During landing rollout, the main concerns are wing rise (roll control), weathervaning (directional control), and downwind drift. Wing rise is controlled by flaperon into the crosswind. Excessive flaperon deflection degrades directional control. Use rudder and differential braking to control ground track, especially on wet or icy runways. Engage NWS if required to maintain directional control and to prevent departure from the runway. Excessive differential braking may result in a hot brake condition. High rudder pedal force may result in a yaw

transient when NWS is engaged. NLG strut compresssion is required to engage NWS but sustained forward stick may result in full horizontal tail deflection which decreases weight on the MLG and thus reduces wheel braking effectiveness. NO Early NWS engagement may be required with the drag chute deployed to control increased weathervaning tendencies.

TOUCH-AND-GO LANDING

Perform a normal approach and landing. After touchdown, maintain landing attitude, advance the throttle, close the speedbrakes, and perform a normal takeoff.

AFTER LANDING

WARNING

Do not use parking brake. Use only chocks, if available, or minimum possible toe brakes pressure to hold the aircraft stationary. NO Parking brake may be used if drag chute was deployed on landing.

1. NO DRAG CHUTE switch - Release as required.

NOTE

NO Turn aircraft into the wind prior to releasing drag chute.

2. PROBE HEAT switch - OFF.

WARNING

If the probe heaters are left on, they may be hot enough to cause serious injury if touched.

CAUTION

Prolonged ground operation of probe heat may cause failure of AOA probe heaters.

3. Speedbrakes - Close.

*4. Ejection safety lever - Safe (Up).

5. IFF MASTER knob - STBY.

6. IFF Mode 4 - HOLD.

7. LANDING TAXI lights - As required.

8. 48 MASTER ZEROIZE switch - As required.

PRIOR TO ENGINE SHUTDOWN

1. EPU safety pin (ground crew) - In.

2. FCNP - Data record.

   - Terminal coordinates - Record (As required).

NOTE

Position error in excess of 3.6 NM/hour or groundspeed in excess of 4 knots is considered out of tolerance.

   - MFL - Record.

3. LESS 48 Brakes - Check in CHAN 2 and then return BRAKES channel switch to CHAN 1.

4. HUD CAMERA switch - OFF.

NOTE

The camera must be turned off at least 15 seconds prior to engine shutdown to allow the tape to unthread.

5. TWS and FCNP - OFF.

NOTE

To prevent INU battery discharge, turn FCNP off prior to engine shutdown.

*6. Seat - Adjust at least 1/2 inch up from full down.

NOTE

Lower seat position will preclude inserting the seat safety pin.

7. PROBE HEAT switch – PROBE HEAT and then OFF to allow check of heaters after shutdown.

WARNING

If the probe heaters are on or have been on, they may be hot enough to cause serious injury if touched.

CAUTION

Prolonged ground operation of probe heat may cause failure of AOA probe heaters.

ENGINE SHUTDOWN

Just prior to engine shutdown, oil scavenge may be performed if maintenance requests it and if conditions permit. To scavenge oil, the throttle may momentarily be advanced to 75-78 percent rpm, then OFF. It is not necessary to stabilize in the 75-78 percent rpm range.

1. Throttle – OFF.

After main generator drops off the line:

2. 66 EPU GEN and EPU PMG (**LESS** 66 GEN EMER) lights – Confirm off.

WARNING

If the light(s) is illuminated, turn the MAIN PWR switch to OFF. Insure that the EPU safety pin remains installed and notify maintenance.

3. MAIN PWR switch – OFF.
4. Oxygen hose/survival kit straps/lapbelt – Stow.
   - Stow oxygen connector in bracket on right sidewall. Insure oxygen hose does not protrude beyond console edge.
   - Stow lapbelt/survival kit straps on seat cushion.

CAUTION

Failure to properly stow lapbelt/survival kit straps, oxygen connector, and oxygen hose may cause damage to consoles and to the ejection seat during seat adjustment.

5. Avionics – As required.
6. Canopy switch – Center.

NOTE

If the internal canopy switch is left in the up position, the canopy will automatically open if closed from the outside.

SCRAMBLE

PREFLIGHT

Perform the following preflight inspections prior to placing the aircraft on alert:

1. EXTERIOR INSPECTION.
2. BEFORE ENTERING COCKPIT.
3. COCKPIT INTERIOR CHECK.
4. BEFORE STARTING ENGINE.
5. STARTING ENGINE.
6. AFTER ENGINE START (include EPU check).
7. Aircraft cocked for scramble – Per local policies and directives.

AIRCRAFT ON ALERT

If the above actions have not been completed prior to scramble, normal preflight procedures should be used.

1. MAIN PWR switch – MAIN PWR.
2. Engine – Start (Throttle IDLE at 15 percent).

3. Canopy – Close and lock.

4. Instruments – Check.

5. FCC, INS PWR pushbuttons – On.

NOTE

Prior to aligning the INS using a stored heading alignment, accomplish a gyrocompass alignment, turn the FCNP FUNCTION knob to OFF (prior to power being removed), and do not move the aircraft.

6. FLCS self-test – Accomplish to test No. 43.

7. Radar – As desired.

8. SMS – As desired.

9. HUD – As required.

10. FCNP FUNCTION knob – NAV.

NOTE

- When rotating the FCNP FUNCTION knob from STOR HDG to NAV, do not hesitate in NORM or the alignment will be lost.

- If time permits, the FCNP FUNCTION knob can be moved to NORM at anytime for a full gyrocompass alignment.

11. (65) EPU GEN and EPU PMG (**LESS** (65) GEN EMER) lights – Confirm off.

WARNING

If the light(s) is illuminated, the EPU will activate using hydrazine when the EPU safety pin is removed.

12. EPU – Check (If EPU safety pin was installed since last EPU check).

WARNING

If the EPU safety pin is reinstalled for any reason, the EPU check must be reaccomplished prior to flight to insure proper EPU operation.

13. Chocks and safety pins (ground crew) – Remove.

*14. Ejection safety lever – Armed (Down).

*15. Flight control surfaces – Cycle.

16. IFF – As required.

HOT REFUELING

HOT REFUELING PRECAUTIONS

Dearming will be performed prior to entry to the hot refueling pit. If suspected hot brakes or other unsafe condition exists, do not enter refueling area. Follow ground crew directions into the refueling area and establish communications with the ground crew. If a malfunction is suspected, stop refueling.

No hot refueling is permitted with an activated EPU, unsafe hung ordnance, hot brakes, or fuel leakage in vicinity of AR receptacle after AR. Safety pins for stores and gun must be installed. In the refueling area, minimum thrust will be used for taxiing, and radio transmissions are prohibited except in emergency.

PRIOR TO HOT PIT ENTRY

1. AFTER LANDING checks – Complete.

2. AIR REFUEL switch – OPEN; RDY light on.

NOTE

- [B] With the AR switch in OPEN, NWS can be engaged or disengaged from either cockpit regardless of the position of the STICK CONTROL switch and without using the paddle switch.

- NWS is still operative even though the NWS light goes off whenever the AR door is opened.

*3. TACAN – OFF.

4. GND JETT ENABLE switch – OFF.

PRIOR TO HOT REFUELING

Perform the following actions prior to refueling:

1. EPU safety pin (ground crew) – Installed.

*2. Personal equipment leads (except oxygen and communication) – As desired.

3. Canopy – As desired.

CAUTION

Insure all cockpit items are secure prior to opening the canopy. With the canopy open, the engine is susceptible to FOD from loose cockpit items.

4. Brake and tire inspection (ground crew) – Complete.

5. Intercom with refueling supervisor – Established.

DURING HOT REFUELING

*1. Be alert for visual or voice signals from refueling supervisor.

*2. Terminate refueling if intercom contact is lost – Visual signal.

*3. Ground control radio frequency – Monitor.

*4. Insure hands are visible to ground crew.

HOT REFUELING COMPLETE

1. AIR REFUEL switch – CLOSE.

2. 66 EPU GEN and EPU PMG (**LESS** 66 GEN EMER) lights – Confirm off.

WARNING

If the light(s) is illuminated, the EPU will activate using hydrazine when the EPU safety pin is removed.

3. EPU safety pin (ground crew) – Removed.

4. Intercom (refueling supervisor) – Disconnect.

5. Taxi clear of refueling area and configure aircraft as required.

QUICK TURNAROUND

PRIOR TO ENGINE SHUTDOWN

1. AFTER LANDING checks – Complete.

2. PRIOR TO ENGINE SHUTDOWN checks – Complete.

3. Communication with ground crew – Establish (If required).

4. ENGINE SHUTDOWN checks – Complete.

5. Aircraft setup – IAW local procedures.

SPECIAL PROCEDURES

EPU HYDRAZINE SUPPORT AT NON-F-16 BASES

At non-F-16 bases, the pilot is responsible for the aircraft. Response actions shall be limited to identification of a hydrazine or EPU problem, isolation, containment, and minimal dilution with water (1 part water to 1 part hydrazine). No major neutralization, maintenance, or hydrazine servicing capability is planned for transient bases. If a hydrazine leak or EPU incident occurs on a base where no disaster response force or bioenvironmental support is available, the pilot must insure that the aircraft is isolated and the leak contained. Refer to Section III for specific procedures for HYDRAZINE LEAK (on the ground) and for LANDING WITH ACTIVATED EPU.

SUPPLEMENTAL PROCEDURES

ANTI-G SUIT HOSE ROUTING

Refer to figure 2-8 for the recommended anti-g suit hose routing.

BUC GROUND START PROCEDURES

The following steps may be substituted for steps 1, 2, and 3 under STARTING ENGINE, this section.

1. JFS switch – START 1 or 2.
   Refer to figure 5-5 for temperature conditions where START 2 is required.

NOTE

If start is not achieved with START 1, verify accumulator precharge prior to using START 2.

2. EEC BUC switch – BUC.

   • EEC caution light – Verify on.

3. Throttle – Advance to IDLE at approximately 25 percent rpm.

CAUTION

- Do not mistake BUC IDLE for IDLE. If the throttle is forward of the IDLE position, a hot start may occur.

- If the engine has been run more than 30 minutes ago and less than 3-1/2 hours ago, do not advance the throttle to IDLE until 40 seconds after the JFS RUN light comes on. The time the JFS RUN light was on during previous start attempts is cumulative toward the 40 seconds.

After light-off:

Light-off is indicated by ignition vibration and increasing rpm. If light-off does not occur within 15 seconds, very slowly advance the throttle until it does occur and then stop all throttle movement.

4. Allow rpm to increase and begin to stabilize (approximately 10 seconds).

CAUTION

If the throttle is advanced earlier, the engine may stall, precluding a successful start since rpm will not accelerate past approximately 45 percent.

As rpm begins to stabilize:

5. Throttle – Advance slowly to produce a steady rpm rise.
   Advance the throttle slowly and smoothly to the backside of the BUC IDLE detent to produce a steady rpm increase similar to a normal UFC start.

   Monitor FTIT during the start; FTIT should not exceed 600°C. If the throttle is rapidly advanced to obtain this FTIT, a hot start may result. If FTIT reaches this value, stop throttle advance, wait for FTIT to stop increasing, and then continue the throttle advance.

When at the backside of the BUC IDLE detent:

6. Throttle – Pause, rotate outboard, and smoothly advance past the detent.
   Pause (2-3 seconds minimum) at the backside of the BUC IDLE detent to allow FTIT and rpm to stabilize. Then rotate the throttle outboard and advance slowly into BUC IDLE.

   Total time to advance the throttle from IDLE to BUC IDLE will be a minimum of 30 seconds.

CAUTION

- To prevent possible engine damage, do not allow FTIT to exceed 680°C.

- The nozzle may remain nearly full open after a BUC start due to insufficient air load. Throttle should not be advanced beyond 75 percent rpm with nozzle above 20 percent.

7. EEC BUC switch – OFF.

NOTE

Prior to placing the EEC BUC switch to OFF, insure the nozzle is at least 10 percent open to preclude an engine stall when transferring back to UFC. If the nozzle is less than 10 percent open, advance the throttle to 75 percent rpm. This provides additional stall margin during transfer back to UFC.

- BUC caution light – Verify off.

8. Throttle – Retard to IDLE at first indication of rpm increase.

CAUTION

- If the throttle is not retarded immediately after first indication of rpm increase, the engine could quickly accelerate to more than 80 percent rpm.
- If the engine fails to transfer to UFC and the throttle is retarded to IDLE, the engine will probably flameout. If this occurs, shut down the engine.

9. EEC BUC switch – EEC.
   - EEC caution light – Verify off.
   - Nozzle – Opens steadily (70-95 percent).
   - FTIT – Decreases.
   - RPM – Verify EEC idle.

EXPANDED FLCS SELF-TEST PROCEDURES

After program stops at test No. 54:

1. SERVO ELEC RESET switch – ELEC only.
2. SERVO ARM switches:
   a. HORIZ – R ARM.
   b. FLAPERON – R ARM.
   c. RUDDER – ARM.
3. ADV SLEW switch – ADV momentarily.
   a. Test No. advances to 57.
   b. FLT CONT SYS, P, R, Y, and all five SERVO lights – On.
   c. DUAL FC FAIL warning light – On.
   d. Program stops.
4. Operate controls – Right horizontal tail, right flaperon, and rudder may respond initially and then lock out; the surfaces do not respond to further control inputs. Left horizontal tail and left flaperon respond.

NOTE

Deflection of those control surfaces which are not locked out may be less than normal.

5. SERVO ARM switches:
   a. HORIZ – L ARM.
   b. FLAPERON – L ARM.
   c. RUDDER – Disarm.
6. ADV SLEW switch – ADV momentarily.
   a. Test No. advances to 58.
   b. FLT CONT SYS, P, R, Y, and all five SERVO lights – On.
   c. DUAL FC FAIL warning light – On.
   d. Program stops.
7. Operate controls – Left horizontal tail and left flaperon may respond initially and then lock out; the surfaces do not respond to further control inputs. Right horizontal tail, right flaperon, and rudder respond.
8. SERVO ARM switches:
   a. HORIZ – Disarm.
   b. FLAPERON – Disarm.
9. FCS CAUTION button and SERVO ELEC RESET switch – Activate SERVO and FCS CAUTION simultaneously and then ELEC momentarily.
10. SERVO ARM switches:
    a. HORIZ – L ARM.
    b. FLAPERON – L ARM.

11. ADV SLEW switch - ADV momentarily.

    a. Test No. advances to 61.

    b. FLT CONT SYS, P, R, Y, and all five SERVO lights - On.

    c. Program stops.

12. SERVO ARM switches:

    a. HORIZ - R ARM.

    b. FLAPERON - R ARM.

    c. RUDDER - ARM.

13. ADV SLEW switch - ADV momentarily.

    a. Test No. advances to 62.

    b. FLT CONT SYS, P, R, Y, and all five SERVO lights - On.

    c. Program stops.

14. SERVO ARM switches - All three disarm.

15. FCS CAUTION button and SERVO ELEC RESET switch - Activate SERVO and FCS CAUTION simultaneously and then ELEC momentarily.

16. ADV SLEW switch - ADV momentarily.

    a. Test No. advances to 63.

    b. Program stops.

    c. MAL light - On.

    d. ECA data word dot light - On.

    e. FLT CONT SYS, P, R, and Y lights - On.

17. FCS CAUTION button and SERVO ELEC RESET switch - Activate SERVO and FCS CAUTION simultaneously and then ELEC momentarily.

18. SELF TEST switch - OFF.

*19. Operate controls - All surfaces respond normally; no FLCS lights on.

TACAN PREFLIGHT CHECK

1. TACAN function knob - T/R. (Allow 90 seconds for warmup.)

2. HSI CRS knob - Set COURSE 180.

3. INSTR MODE knob - TCN.

4. TACAN TEST button - Depress momentarily (less than 1 second).

    - TACAN TEST light - Flashes momentarily.
    - HSI range and course warning flags - In view.
    - HSI bearing pointer may temporarily slew to 270 degrees.
    - HSI range and course warning flags - Out of view.
    - HSI range indicator - Indicates 000 (±0.5) nm.
    - HSI bearing pointer - Indicates 180 (±3) degrees.
    - HSI CDI - Center within ±1/2 dot.
    - HSI TO-FROM indicator - TO.

STRANGE FIELD PROCEDURES

Refer to figure 2-5.

FUEL MANAGEMENT

Fuel management (figure 2-4) applies only to Block 10 aircraft.

Fuel management procedures prevent operational CG's aft of the limits established for departure resistance. Fuel management (other than monitoring) is not required when carrying category II loadings with the STORES CONFIG switch in CAT III. The maneuver limits of figure 5-9 apply.

WARNING

Selection of AFT ENG FEED prior to reaching the specified totalizer reading or failure to select NORM ENG FEED when the required differential is reached may result in filling the forward and right wing tanks, causing an undesirable lateral asymmetry and reducing departure resistance.

NOTE

- The following procedures (figure 2-4) may result in forward fuel distributions which will uncover the red zone on the AL fuel quantity pointer.
- Select AFT ENG FEED when the specified fuel remaining is reached, if necessary, to establish the specified forward/aft fuel system differential. Refer to figure 2-4 for totalizer readings and fuel differentials.

Fuel Management

Fuel management applies only to Block 10 aircraft.

NOTES:

(1) Categories I, II, and III are the AOA and rolling limits shown in Section V.

(2) Totalizer reading denotes fuel quantity to begin fuel balancing. Pointers denote fuel spread for A minimum forward tank heavy or B maximum aft tank heavy.

(3) BEFORE BALANCING limits – The limits apply anytime prior to achieving the specified pointer spread as long as fuel transfer starts at the specified totalizer reading.

(4) AFTER BALANCING limits – These apply whenever the specified pointer spread exists.

(5) IF BALANCING DELAYED limits –These apply when fuel transfer is delayed below the specified totalizer value until the specified pointer spread is achieved or when the pointer spread can no longer be maintained because of low fuel considerations.

(6) CONFIGURATION ADJUSTMENT. For changes in baseline loading, add to or subtract from the totalizer and pointer spread adjustments shown on the fuel quantity indicator. Individual adjustments are additive.

(7) Do not exceed 15 degrees AOA or perform maximum command rolling maneuvers.

(8) No adjustments required to baseline fuel management if configuration has no ammo or cases and 0 or 1 AIM-9. B Two pilots are required.

(9) B No adjustments required to baseline fuel management if configuration has full ammo or cases, 0 AIM-9's, and 1 pilot.

(10) B A maximum aft heavy distribution of 1100 pounds is only fuel balancing adjustment required if configuration has full ammo or cases, 1 AIM-9, and 1 pilot.

Figure 2-4. (Sheet 1)

Fuel Management

F-16A

LOADING CATEGORY I

BASELINE LOADING CONFIGURATION	FUEL BALANCING REQUIRED (2)		LIMITS (1) BEFORE BALANCE (3)	LIMITS (1) AFTER BALANCE (4)	LIMITS (1) IF BAL DELAYED (5)
FULL AMMO OR CASES & 0, 1, OR 2 AIM-9's	TOTALIZER 05800 POINTER SPREAD 300 MIN FWD HEAVY		CAT I	CAT I	CAT I
CONFIGURATION ADJUSTMENTS (6) (8)	ADJUST TOTALIZER	ADJUST POINTER SPREAD			
• NO AMMO OR CASES • 3 OR 4 AIM-9's	−100 −200	+100 +300	CAT I	CAT I	CAT III

• NO ADJUSTMENTS REQUIRED FOR ANY CENTERLINE STORE OR ACMI POD CARRIED IN LIEU OF AN AIM-9.

020-1

F-16A

LOADING CATEGORY II

BASELINE LOADING CONFIGURATION	FUEL BALANCING REQUIRED (2)		LIMITS (1) BEFORE BALANCE (3)	LIMITS (1) AFTER BALANCE (4)	LIMITS (1) IF BAL DELAYED (5)
FULL AMMO OR CASES & 0, 1, OR 2 AIM-9's PLUS EMPTY PYLONS AT STA 3 & 7	TOTALIZER 05600 POINTER SPREAD 500 MIN FWD HEAVY		CAT II	CAT II	CAT III
CONFIGURATION ADJUSTMENTS (6) (8)	ADJUST TOTALIZER	ADJUST POINTER SPREAD			
DOWNLOAD PYLONS AT STA 3 & 7 AND UPLOAD 370-GALLON TANKS AT STA 4 & 6	−200	+300	CAT II	CAT II	CAT III
• NO AMMO OR CASES • 3, 4, 5, OR 6 AIM-9's	−100 −200	+100 +300	CAT III	CAT II	CAT III

• NO ADJUSTMENTS REQUIRED FOR ANY CENTERLINE STORE, FOR EMPTY PYLONS AT STA 4 & 6, OR FOR ACMI PODS CARRIED IN LIEU OF AIM-9's.

020-2

Figure 2-4. (Sheet 2)

Fuel Management

F-16A

LOADING CATEGORY III

BASELINE LOADING CONFIGURATION	FUEL BALANCING REQUIRED (2)		LIMITS (1) BEFORE BALANCE (3)	LIMITS (1) AFTER BALANCE (4)	LIMITS (1) IF BAL DELAYED (5)
FULL AMMO OR CASES & 0, 1, OR 2 AIM-9's AND ANY CAT III LOADING	TOTALIZER 05800 POINTER SPREAD 300 MIN FWD HEAVY		CAT III	CAT III	CAT III (7)
CONFIGURATION ADJUSTMENTS (6)	**ADJUST TOTALIZER**	**ADJUST POINTER SPREAD**			
• NO AMMO OR CASES	−100	+200	CAT III	CAT III	CAT III (7)
• LAUNCHER AT STA 2 & 8	−100	+100			

• NO ADJUSTMENTS REQUIRED FOR ANY CENTERLINE STORE OR ACMI POD CARRIED IN LIEU OF AN AIM-9.

029-1

F-16B

LOADING CATEGORY I

BASELINE LOADING CONFIGURATION	FUEL BALANCING REQUIRED (2)		LIMITS (1) BEFORE BALANCE (3)	LIMITS (1) AFTER BALANCE (4)	LIMITS (1) IF BAL DELAYED (5)
FULL AMMO OR CASES & 0, 1, OR 2 AIM-9's WITH 2 PILOTS	TOTALIZER 04600 POINTER SPREAD 1200 MAX AFT HEAVY		CAT I	CAT I	CAT I
CONFIGURATION ADJUSTMENTS (6) (8) (9) (10)	**ADJUST TOTALIZER**	**ADJUST POINTER SPREAD**			
• NO AMMO OR CASES	−100	−100	CAT III	CAT I	CAT III
• 3 OR 4 AIM-9's	−200	−300			
• ONE PILOT	−200	−300			

• NO ADJUSTMENTS REQUIRED FOR ANY CENTERLINE STORE OR ACMI POD CARRIED IN LIEU OF AN AIM-9.

021-1

Figure 2-4. (Sheet 3)

Fuel Management

F-16B

LOADING CATEGORY II

BASELINE LOADING CONFIGURATION	FUEL BALANCING REQUIRED (2)		LIMITS (1) BEFORE BALANCE (3)	LIMITS (1) AFTER BALANCE (4)	LIMITS (1) IF BAL DELAYED (5)
FULL AMMO OR CASES & 0, 1, OR 2 AIM-9's PLUS EMPTY PYLONS AT STA 3 & 7, 2 PILOTS	TOTALIZER 04600 POINTER SPREAD 1000 MAX AFT HEAVY		CAT II	CAT II	CAT II
CONFIGURATION ADJUSTMENTS (6) (8) (9)	**ADJUST TOTALIZER**	**ADJUST POINTER SPREAD**			
DOWNLOAD PYLONS AT STA 3 & 7 AND UPLOAD 370-GALLON TANKS AT STA 4 & 6	−200	−300	CAT III	CAT II	CAT III
• NO AMMO OR CASES • 3, 4, 5, OR 6 AIM-9's • ONE PILOT	−100 −200 −200	−100 −300 −300	CAT III	CAT II	CAT III

• NO ADJUSTMENTS REQUIRED FOR ANY CENTERLINE STORE, FOR EMPTY PYLONS AT STA 4 & 6, OR FOR ACMI PODS CARRIED IN LIEU OF AIM-9's.

021-2

F-16B

LOADING CATEGORY III

BASELINE LOADING CONFIGURATION	FUEL BALANCING REQUIRED (2)		LIMITS (1) BEFORE BALANCE (3)	LIMITS (1) AFTER BALANCE (4)	LIMITS (1) IF BAL DELAYED (5)
FULL AMMO OR CASES & 0, 1, OR 2 AIM-9's WITH 2 PILOTS AND CAT III LOADING	TOTALIZER 04600 POINTER SPREAD 1300 MAX AFT HEAVY		CAT III	CAT III	CAT III (7)
CONFIGURATION ADJUSTMENTS (6)	**ADJUST TOTALIZER**	**ADJUST POINTER SPREAD**			
• NO AMMO OR CASES • ONE PILOT • LAUNCHER AT STA 2 & 8	−100 −200 −100	−200 −300 −100	CAT III	CAT III	CAT III (7)

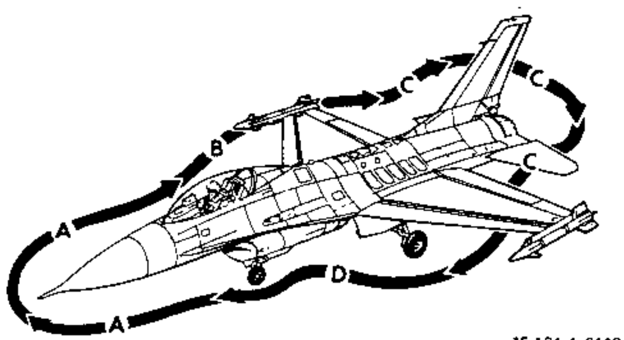
• NO ADJUSTMENTS REQUIRED FOR ANY CENTERLINE STORE OR ACMI POD CARRIED IN LIEU OF AN AIM-9.

029-2

Figure 2-4. (Sheet 4)

Exterior Inspection (Typical)

NOTE: Check aircraft condition for loose doors & fasteners, cracks, dents, leaks, and other discrepancies.



1F-16A-1-0113

NOSE – A

1. FORWARD FUSELAGE:
   - A. CANOPY EXTERNAL JETTISON HANDLES (2) – SECURE.
   - B. PITOT-STATIC PROBES (2) – COVERS REMOVED.
   - C. AOA PROBES (2) – COVERS REMOVED, FREEDOM OF MOVEMENT AND ALIGNMENT CHECKED.
   - D. STATIC PORTS (2) – CONDITION.
   - E. DE NO A ID LIGHT – CONDITION.
   - F. RADOME – SECURE.
   - G. ENGINE INLET DUCT – CLEAR.
   - H. EPU FIRED INDICATOR – CHECK.
   - I. ECS RAM INLET DUCTS – CLEAR.

CENTER FUSELAGE & RIGHT WING – B

1. RIGHT MLG:
   - A. TIRE, WHEEL, AND STRUT – CONDITION.
   - B. UPLOCK ROLLER – CHECK.
   - C. DOOR LINKAGE – SECURE.
   - D. LG SAFETY PIN – INSTALLED.
   - E. TAXI LIGHT – CONDITION.
2. RIGHT WING:
   - A. HYDRAZINE DETECTOR – CHECK.
   - B. EPU NITROGEN BOTTLE – CHARGED.
   - C. HYD SYS A QTY AND ACCUMULATOR – CHECK.
   - D. GUN-RNDS COUNTER AND RNDS LIMIT – SET.
   - E. SECURE VOICE PROCESSOR – CHECK.
   - F. EPU EXHAUST PORT – CONDITION.
   - G. LEF – CONDITION.
   - H. STORES AND PYLONS – SECURE (PREFLIGHT IAW T.O. 1F-16A-34-1-1CL-1).
   - I. NAV AND FORM LIGHTS – CONDITION.
   - J. FLAPERON – CONDITION.

AFT FUSELAGE – C

1. TAIL:
   - A. **LESS** 73 MAIN FUEL SHUTOFF VALVE LEVER – CHECK SAFETY-WIRED TO OPEN (OUTBOARD).
   - B. ADG – CHECK.
   - C. BRAKE/JFS/59 CSD ACCUMULATORS – CHARGED.
   - D. HOOK – CONDITION AND PIN FREE TO MOVE.
   - E. NO DRAG CHUTE ACCUMULATOR – CHARGED.
   - F. VENTRAL FINS, SPEEDBRAKES, HORIZONTAL TAILS, RUDDER – CONDITION.
   - G. NO DRAG CHUTE HOUSING – CONDITION.
   - H. ENGINE EXHAUST AREA – CONDITION.
   - I. NAV AND FORM LIGHTS – CONDITION.
   - J. BLOCK 15 VERTICAL TAIL LIGHT – CONDITION.
   - K. FLCS ACCUMULATORS – CHARGED.
   - L. JFS DOORS – CLOSED.

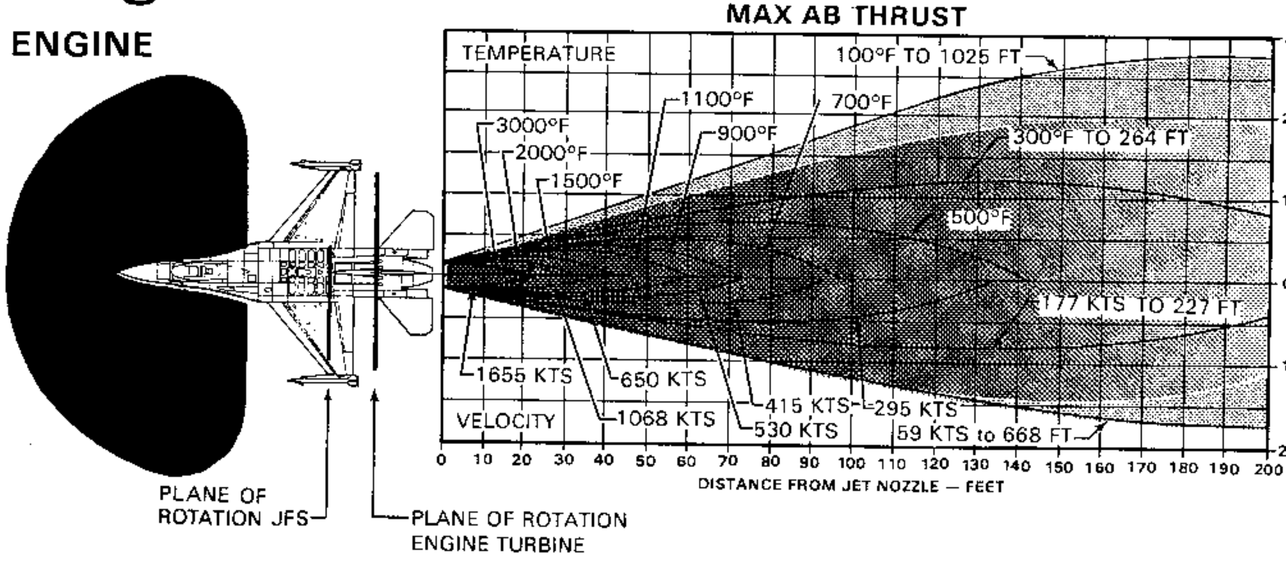
LEFT WING & CENTER FUSELAGE – D

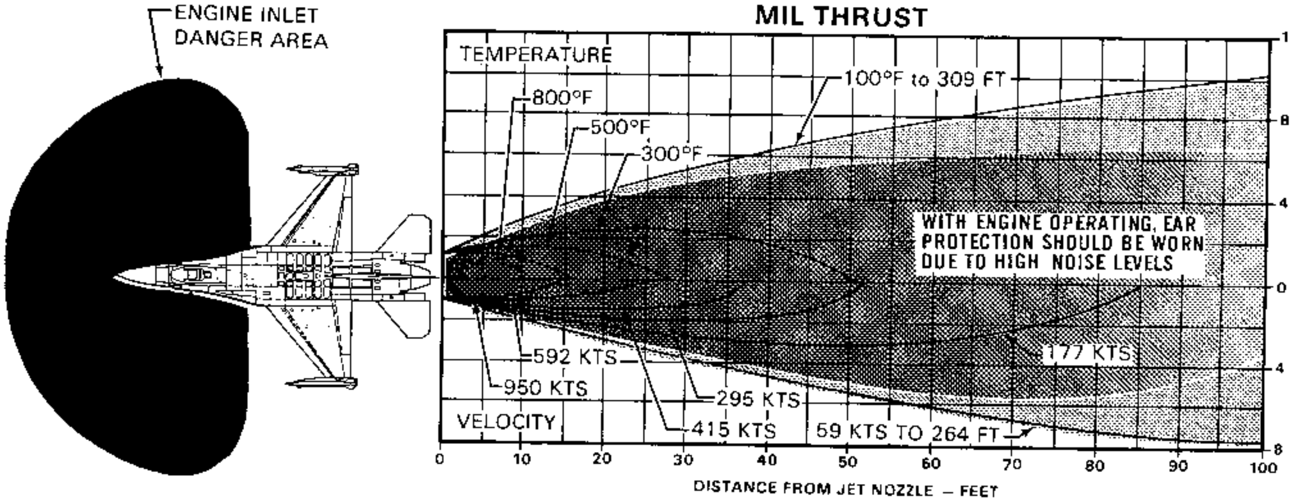
1. LEFT WING:
   - A. FLAPERON – CONDITION.
   - B. NAV AND FORM LIGHTS – CONDITION.
   - C. STORES AND PYLONS – SECURE (PREFLIGHT IAW T.O. 1F-16A-34-1-1CL-1).
   - D. LEF – CONDITION.
   - E. FUEL VENT OUTLET – CLEAR.
   - F. HYD SYS B QTY AND ACCUMULATOR – CHECK.
2. LEFT MLG:
   - A. TIRE, WHEEL, AND STRUT – CONDITION.
   - B. UPLOCK ROLLER – CHECK.
   - C. DOORS AND LINKAGE – SECURE.
   - D. LG SAFETY PIN – INSTALLED.
   - E. LG PIN CONTAINER – CHECK CONDITION.
   - F. LANDING LIGHT – CONDITION.
3. FUSELAGE:
   - A. GUN PORT – CONDITION.
   - B. IFF – CHECK.
   - C. AVTR – CHECK.
4. UNDERSIDE:
   - A. NLG TIRE, WHEEL, AND STRUT – CONDITION.
   - B. NLG SCISSORS LINK PIN AND LG SAFETY PIN – INSTALLED.
   - C. NLG DOOR AND LINKAGE – SECURE.
   - D. LG/HOOK EMERGENCY PNEUMATIC BOTTLE PRESSURE – WITHIN PLACARD LIMITS.

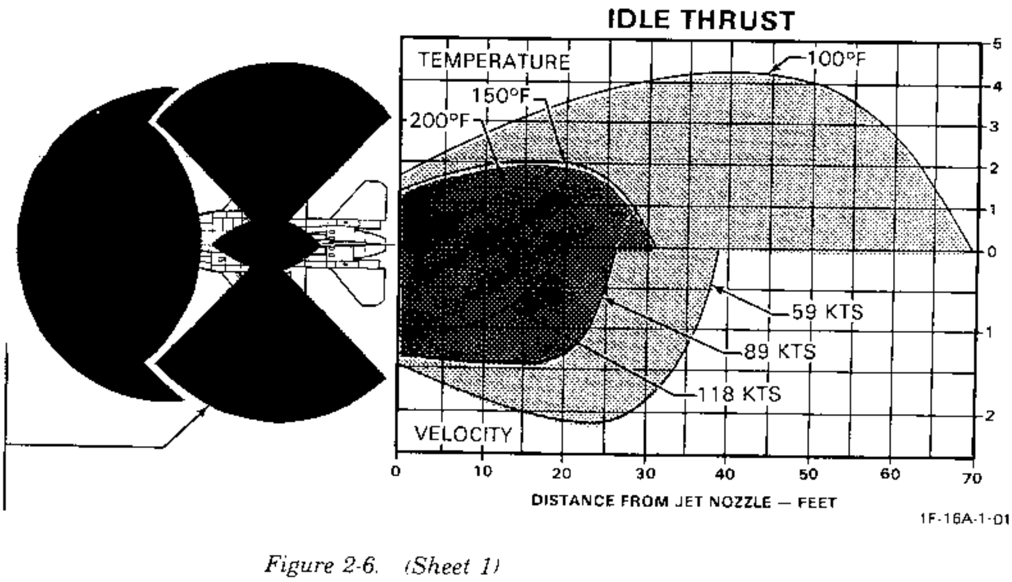
Figure 2-5.

Danger Areas

ENGINE







TIRES

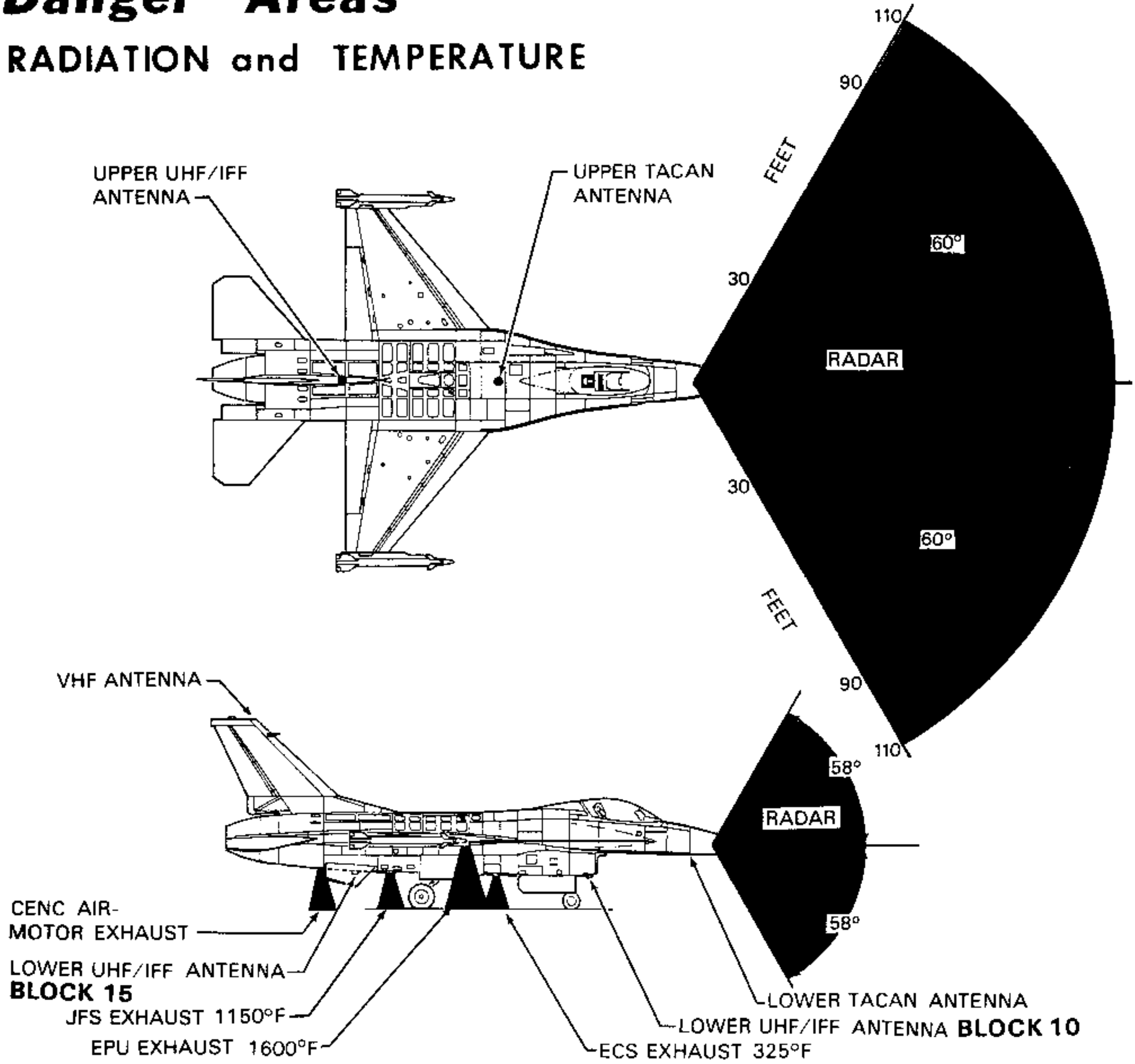
WITH HOT BRAKES AVOID TIRE AREA FOR 45-60 MINUTES AFTER AIRCRAFT HAS STOPPED. IF REQUIRED, APPROACH FROM THE FRONT OR REAR ONLY.

1F-16A-1-0115

Figure 2-6. (Sheet 1)

Danger Areas

RADIATION and TEMPERATURE



RADIATION

OPERATING TRANSMITTERS	MINIMUM SAFE DISTANCE FROM ANTENNAS IN FEET		
	VOLATILE FLUIDS	PERSONNEL	EED
UPPER AND LOWER UHF/IFF UPPER AND LOWER TACAN VHF	—	1	—
FIRE CONTROL RADAR	30	90	110

EED = ELECTRO-EXPLOSIVE DEVICE

NOTE:
Distance from radar disk to forward tip of radome = 5 feet

1F-16A-1-0116

Figure 2-6. (Sheet 2)

Danger Areas

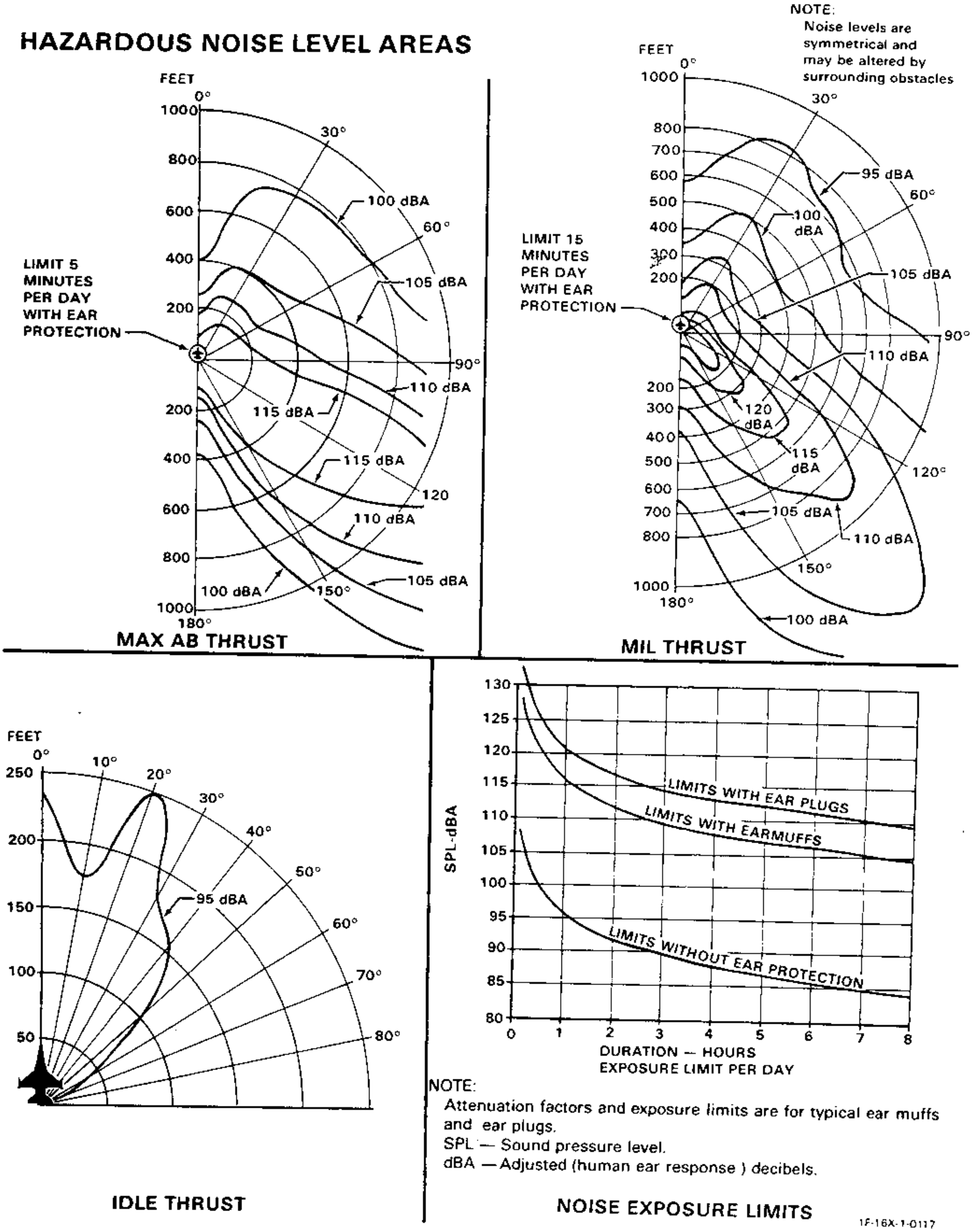
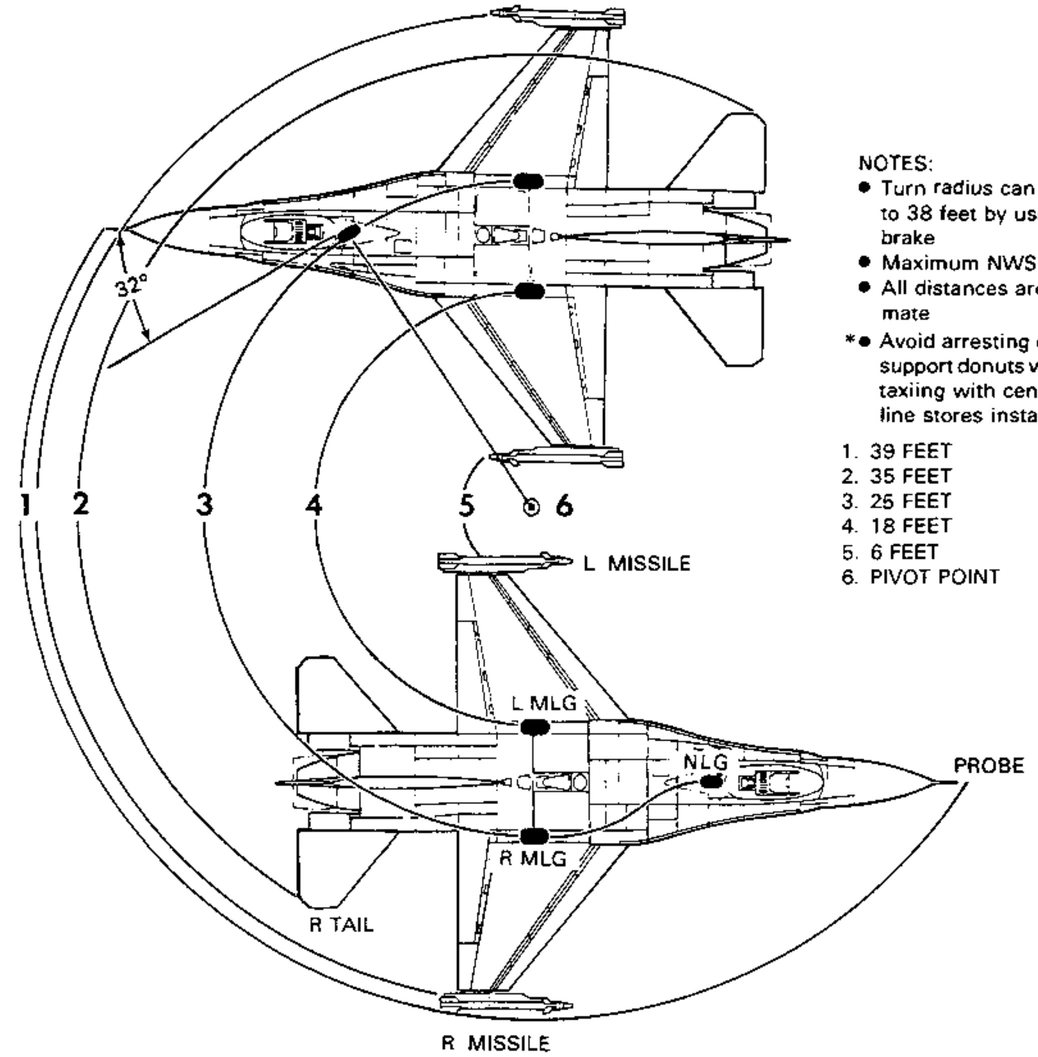


Figure 2-6. (Sheet 3)

Turning Radius and Ground Clearance



NOTES:
- Turn radius can be reduced to 38 feet by using inside brake
- Maximum NWS deflection
- All distances are approximate
- * Avoid arresting cable support donuts when taxiing with centerline stores installed

1. 39 FEET
2. 35 FEET
3. 25 FEET
4. 18 FEET
5. 6 FEET
6. PIVOT POINT

WARNING

With heavy asymmetries, reduce taxi speed, avoid sharp turns, and, when possible, turn toward heavy side to prevent possible tipping.

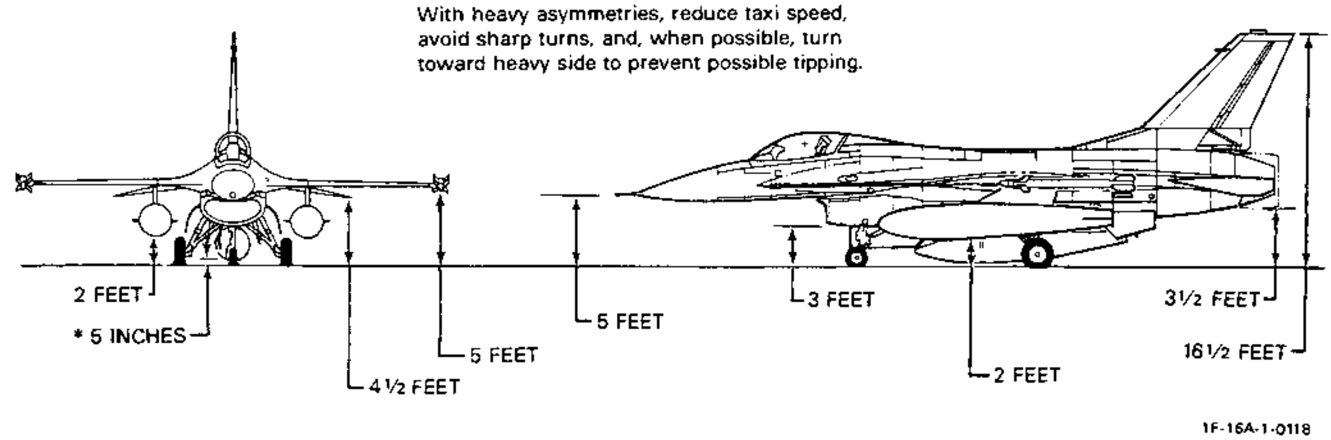


Figure 2-7.

Anti-G Suit Hose Routing (Typical)

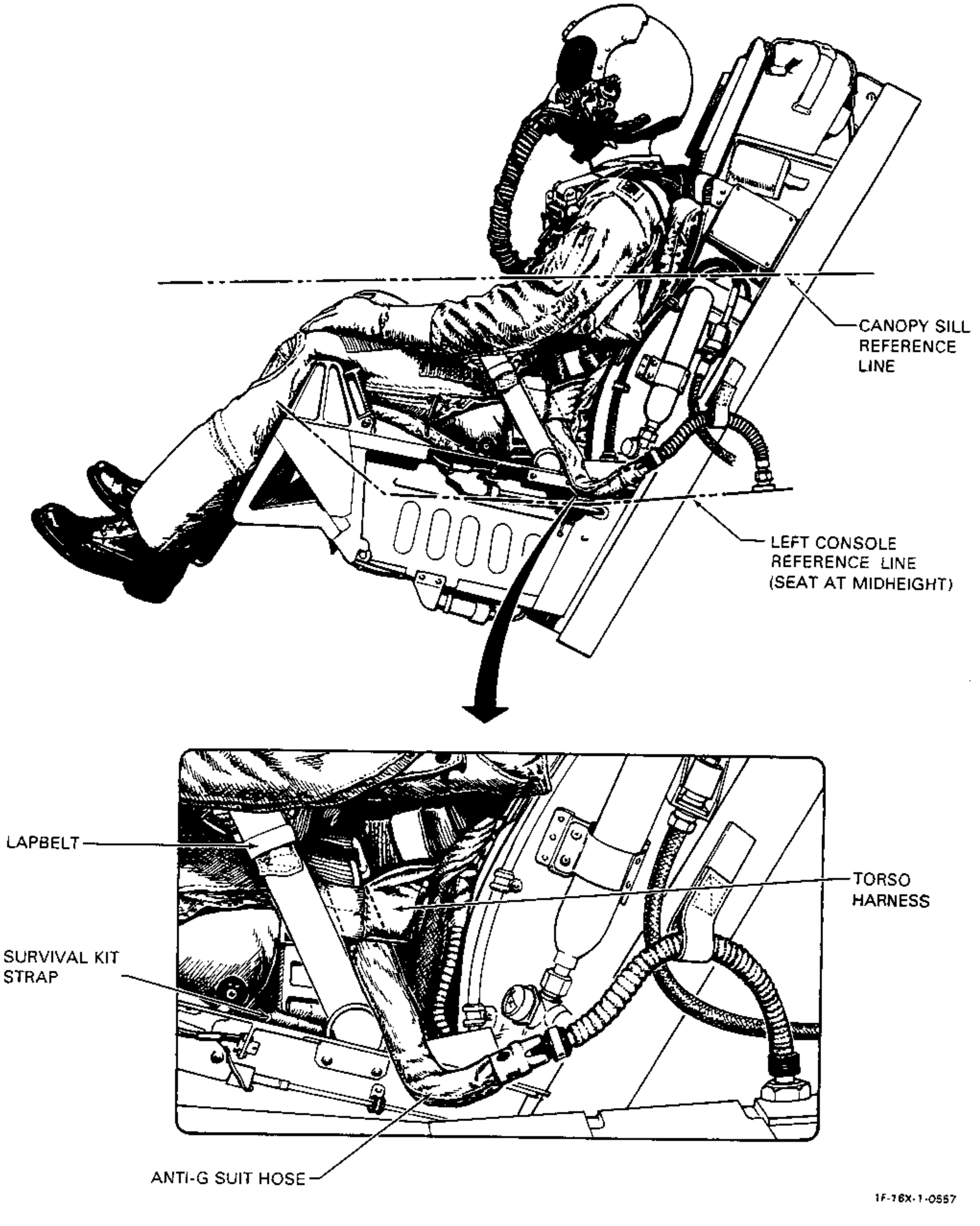


Figure 2-8.

SECTION III
EMERGENCY PROCEDURES

TABLE OF CONTENTS

INTRODUCTION

This section covers the operation of the aircraft during emergency/abnormal conditions. It includes a discussion of problem indications and corrective actions as well as procedural steps when applicable. Adherence to these guidelines will insure maximum safety for the pilot and/or aircraft. The situations covered are representative of the most probable malfunctions. However, multiple emergencies, adverse weather, or other factors may require modification of the recommended procedures. Only those steps required to correct or manage the problem should be accomplished. When dealing with emergency/abnormal conditions, it is essential to determine the most correct course of action by using sound judgment and a full understanding of the applicable system(s). When practical, other concerned agencies (i.e., flight lead, tower, etc.) should be advised of the problem and intended course of action.

Three basic rules, which apply to all emergencies, are established:

1. MAINTAIN AIRCRAFT CONTROL.
2. ANALYZE THE SITUATION AND TAKE PROPER ACTION.
3. LAND AS THE SITUATION DICTATES.

The following information provides general landing guidance:

Land As Soon As Possible

An emergency will be declared. A landing should be accomplished at the nearest suitable airfield considering the severity of the emergency, weather conditions, airfield facilities, lighting, aircraft GW, and command guidance.

Land As Soon As Practical

Emergency conditions are less urgent and, although the flight is to be terminated, the degree of the emergency is such that an immediate landing at the nearest suitable airfield may not be necessary.

WARNING

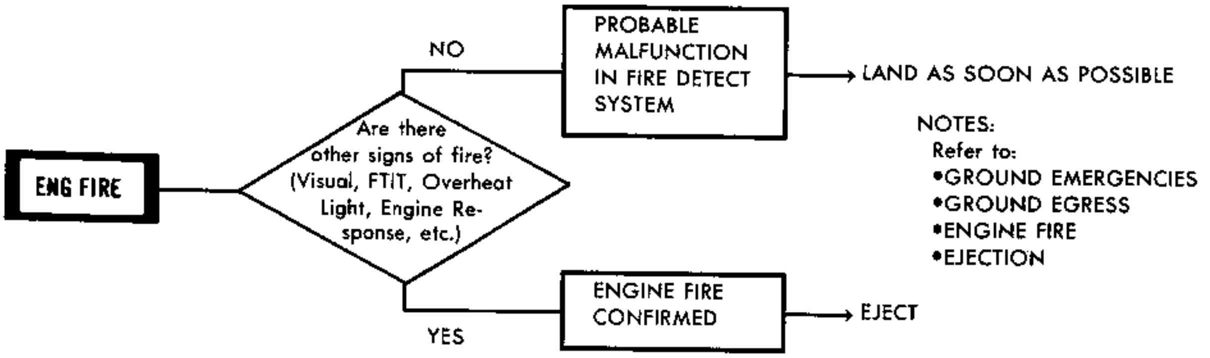
The canopy should remain closed during all emergencies that could result in a crash or fire such as crash landings, aborted takeoffs, and arrestments. The protection the canopy affords far outweighs the isolated risk of entrapment due to a canopy malfunction or overturn.

WARNING AND CAUTION LIGHT ANALYSIS

Refer to figures 3-1 and 3-2 for analysis and amplification of warning and caution light procedures. Fault trees show interrelationships with examples of problem events and corrective action.

Warning Light Analysis

WARNING LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
ENG FIRE	Engine compartment fire	Refer to ENGINE FIRE



WARNING LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
T.O./LAND CONFIG	Aircraft configuration wrong for takeoff or landing Any of the following: 1. LG not down and locked 2. TEF's not fully down	**A.** For TEF's and LG problems, refer to FLCS FAILURES and LANDING EMERGENCIES **B.** Execute a landing using normal AOA if TEF's will not extend

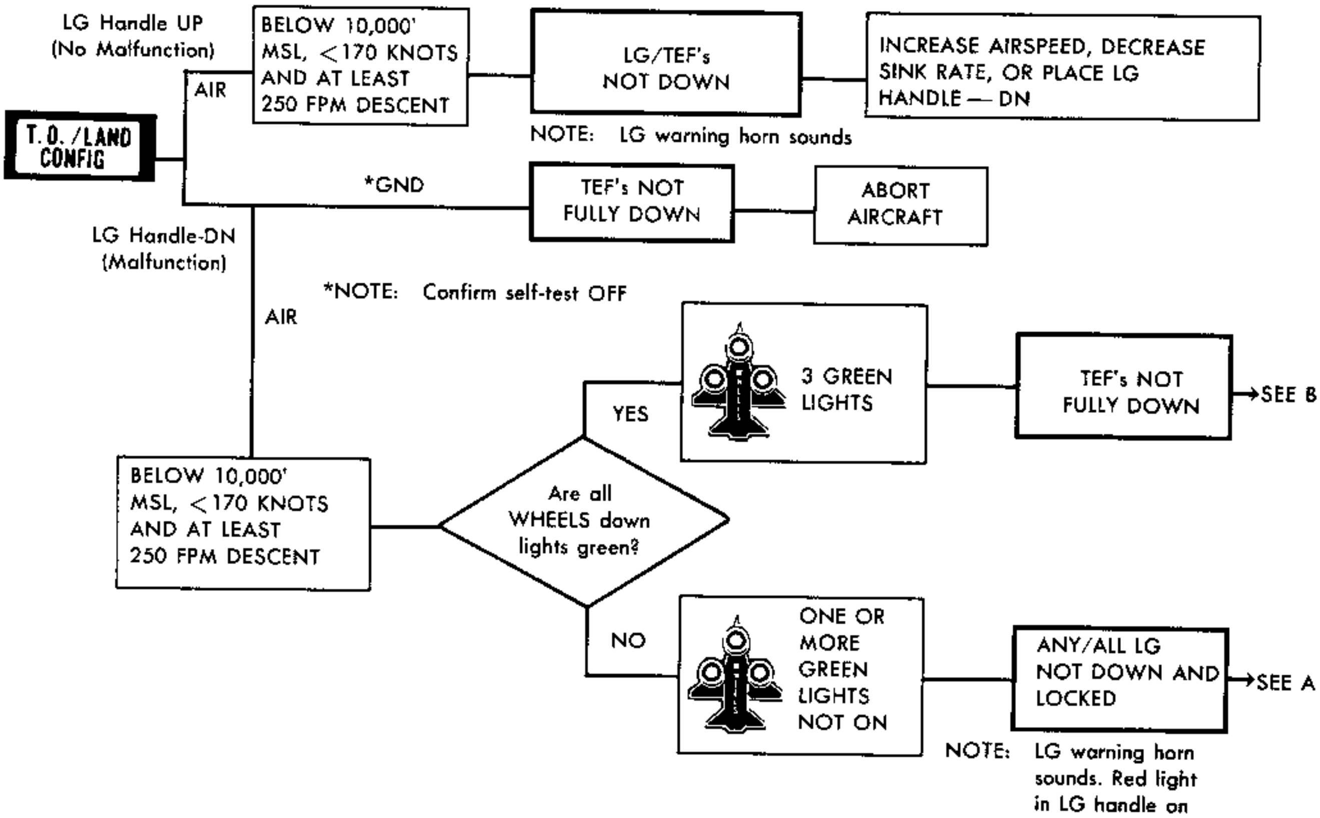


Figure 3-1. (Sheet 1)

Warning Light Analysis

WARNING LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
DUAL FC FAIL	Dual AOA failure in the air data system (ADC caution light illuminates after first failure)	**A.** Refer to ADC MALFUNCTIONS
	Dual electronics failure in one axis of the FLCS (P, R, or Y light illuminated after the first failure)	**B.** Refer to P, R, AND Y MALFUNCTIONS
	Illuminates to indicate a second servo failure in a single branch after an ISA has been armed	**C.** Refer to SERVO MALFUNCTION

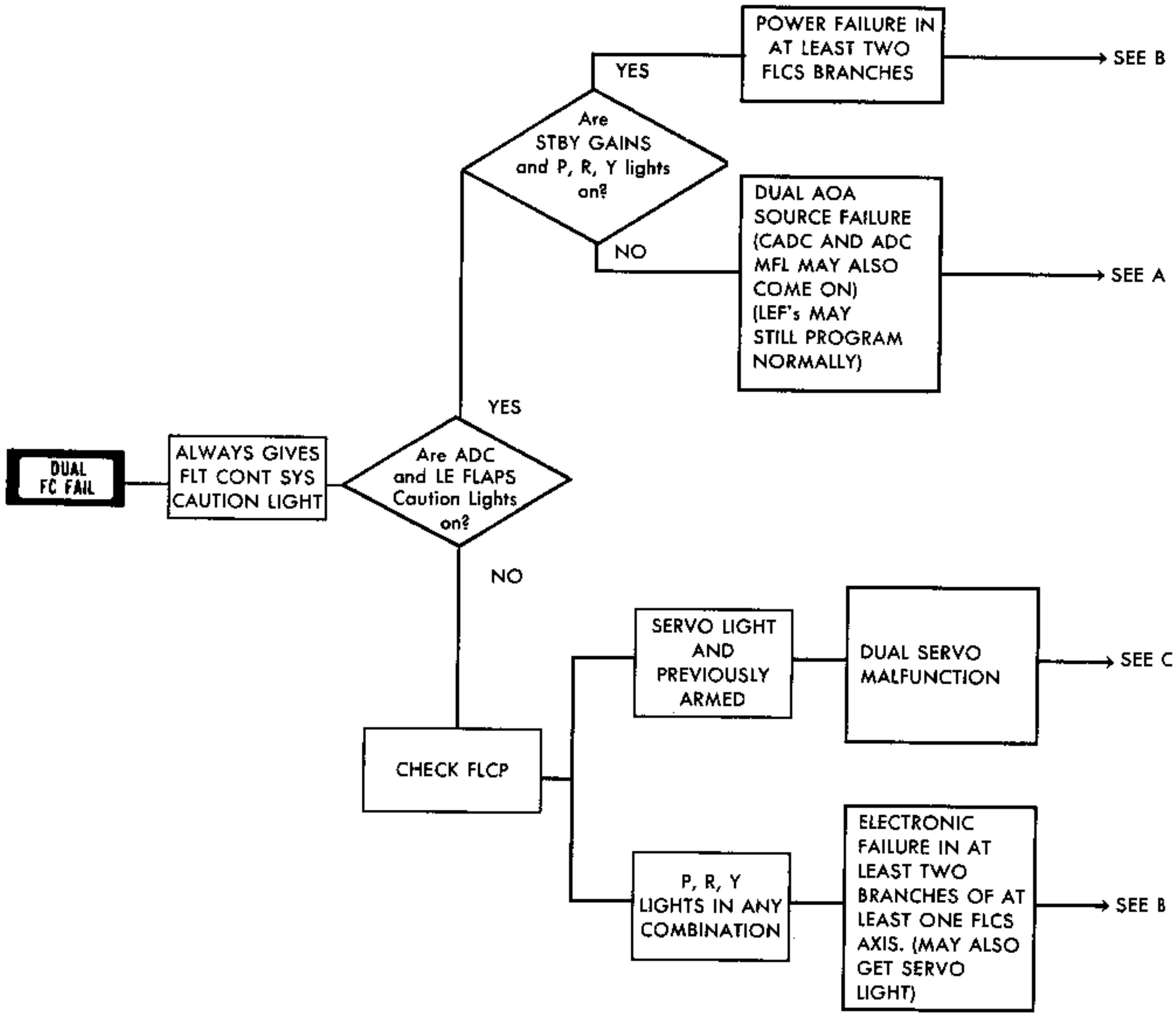


Figure 3-1. (Sheet 2)

Warning Light Analysis

WARNING LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
HYD/OIL PRESS	Low pressure in one or both hydraulic systems, low engine oil pressure, or low oil pressure switch failure	Check pressure indicators to determine system and condition Refer to: • OIL PRESSURE MALFUNCTION • HYDRAULIC MALFUNCTIONS

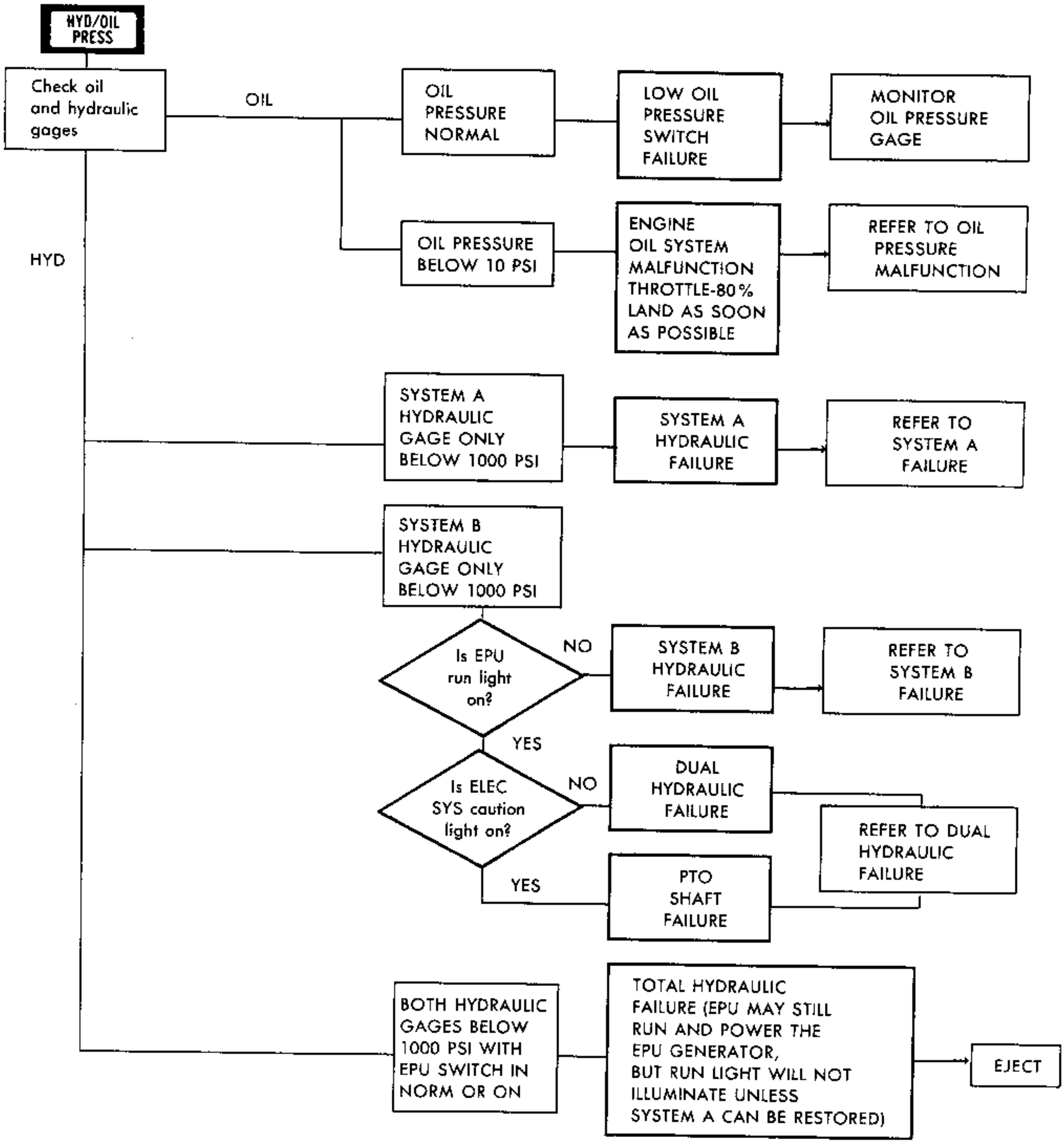
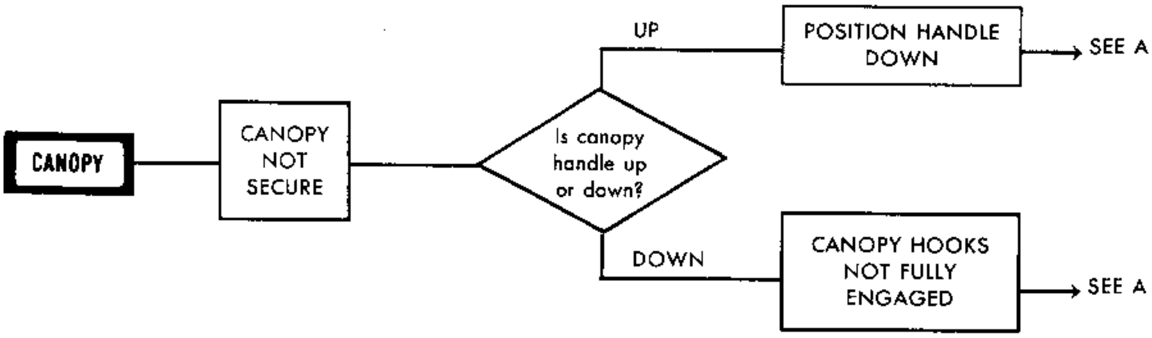


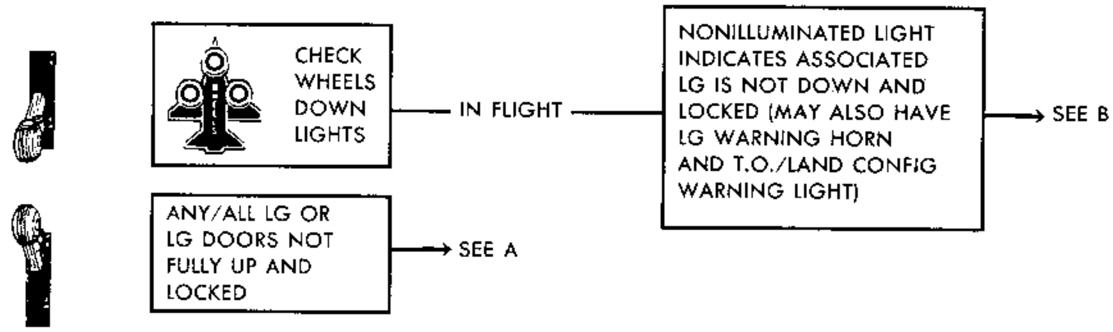
Figure 3-1. (Sheet 3)

Warning Light Analysis

WARNING LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
CANOPY	Canopy hooks or lock not secure	**A.** • Push handle down further into locked (outboard) position, or if on the ground, inform maintenance • Refer to CANOPY LOSS IN FLIGHT



WARNING LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
 Red light in end of handle	LG or LG door not in position commanded by LG handle	Refer to: **A.** LG FAILS TO RETRACT **B.** LG FAILS TO EXTEND



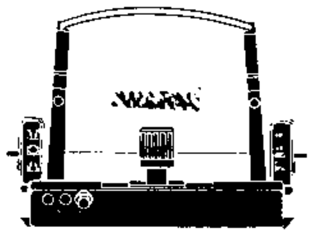
WARNING LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
Blinking WARN symbol 	One or more red warning lights illuminated in the cockpit **WARNING** **BLOCK 10 LESS 57** The HUD WARN symbol and voice warning may not occur when a warning light on the glareshield illuminates. After reset, they may not indicate subsequent warnings until the original warning condition is eliminated.	Check for specific illuminated warning light Reset by toggling WARN RESET switch on HUD control panel
RDR ALT LOW 46	Not used	Not used

Figure 3-1. (Sheet 4)

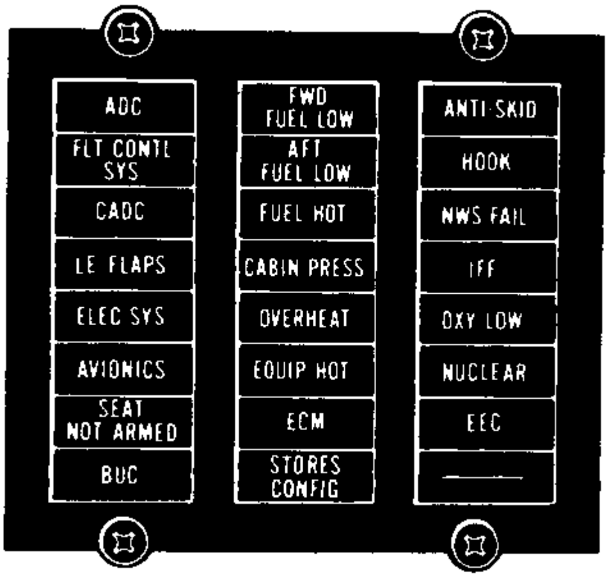
Warning Light Analysis

WARNING LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
ENGINE 57	Engine: • Subidle • Stagnation • Overtemperature	Check RPM and FTIT indicators

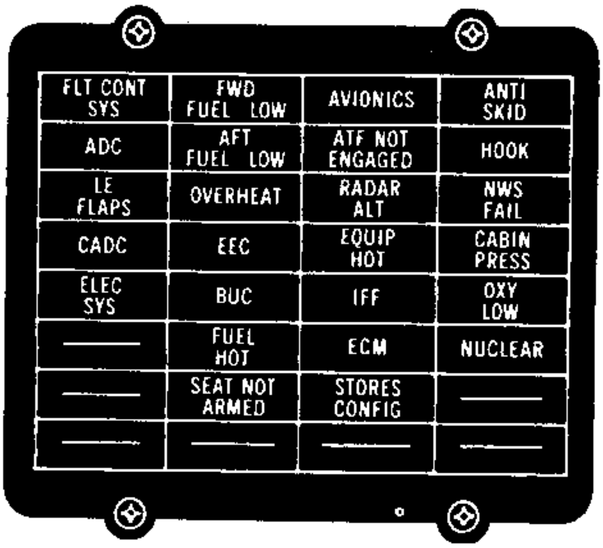
Figure 3-1. (Sheet 5)

Caution Light Analysis

CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
MASTER CAUTION PRESS TO RESET	One or more caution lights on	Check for specific caution light on caution light panel Reset MASTER CAUTION light **NOTE** The MASTER CAUTION light will not reset when the ELEC SYS or FLT CONT SYS caution light is illuminated. The ELEC CAUTION RESET button must be depressed or the electrical malfunction cleared to extinguish ELEC SYS and MASTER CAUTION lights. For FLT CONT SYS light, the FLCS SERVO ELEC RESET switch must be placed to ELEC, FCS CAUTION reset button depressed, or the malfunction cleared to extinguish FLT CONT SYS and MASTER CAUTION lights.



BLOCK 10



BLOCK 15

Figure 3-2. (Sheet 1)

Caution Light Analysis

CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
ADC or ADC CADC or ADC LE FLAPS FLT CONT SYS STBY GAINS	Single or dual failure in either pressure sensing/computation system or AOA system	**A.** Refer to ADC MALFUNCTIONS

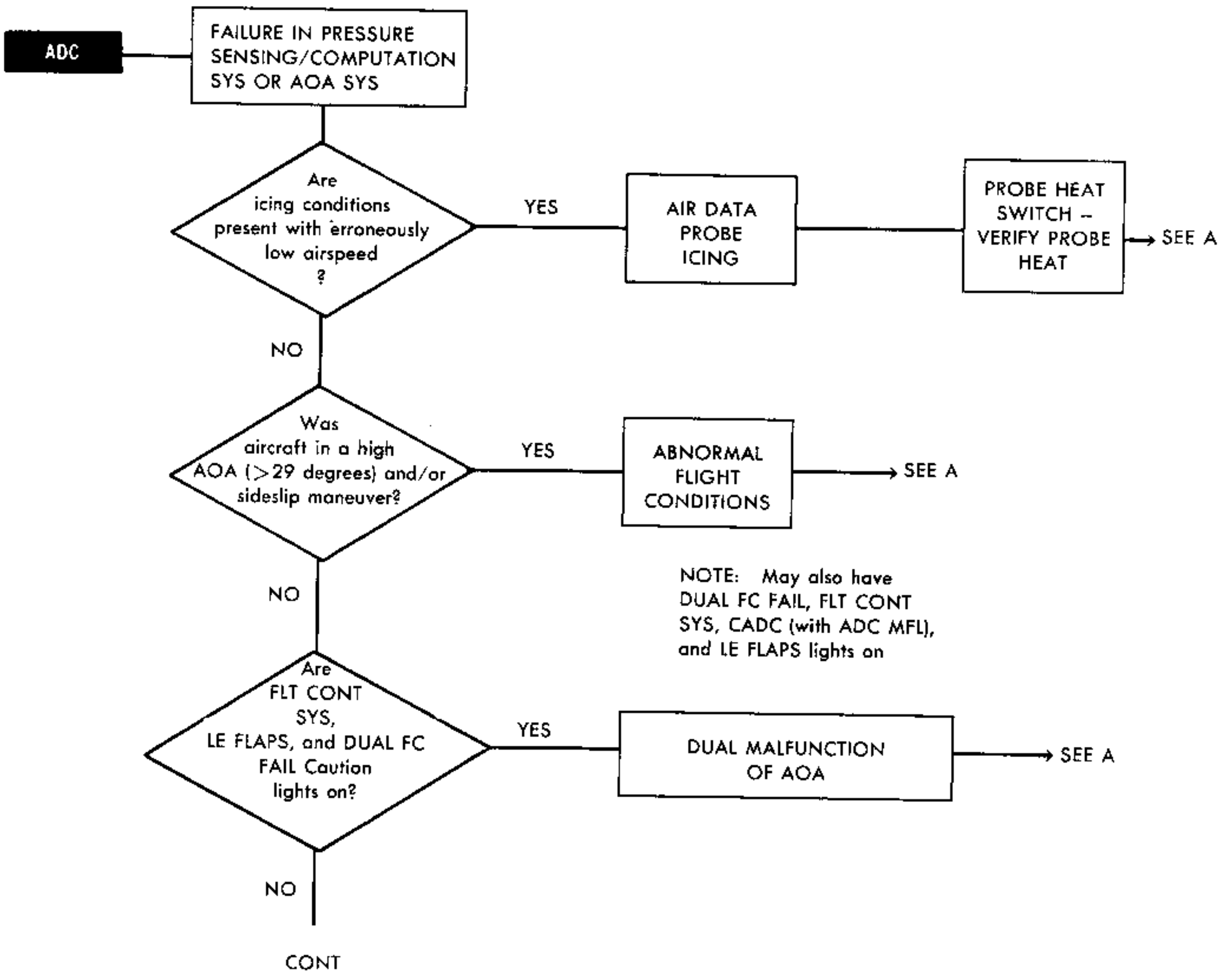


Figure 3-2. (Sheet 2)

Caution Light Analysis

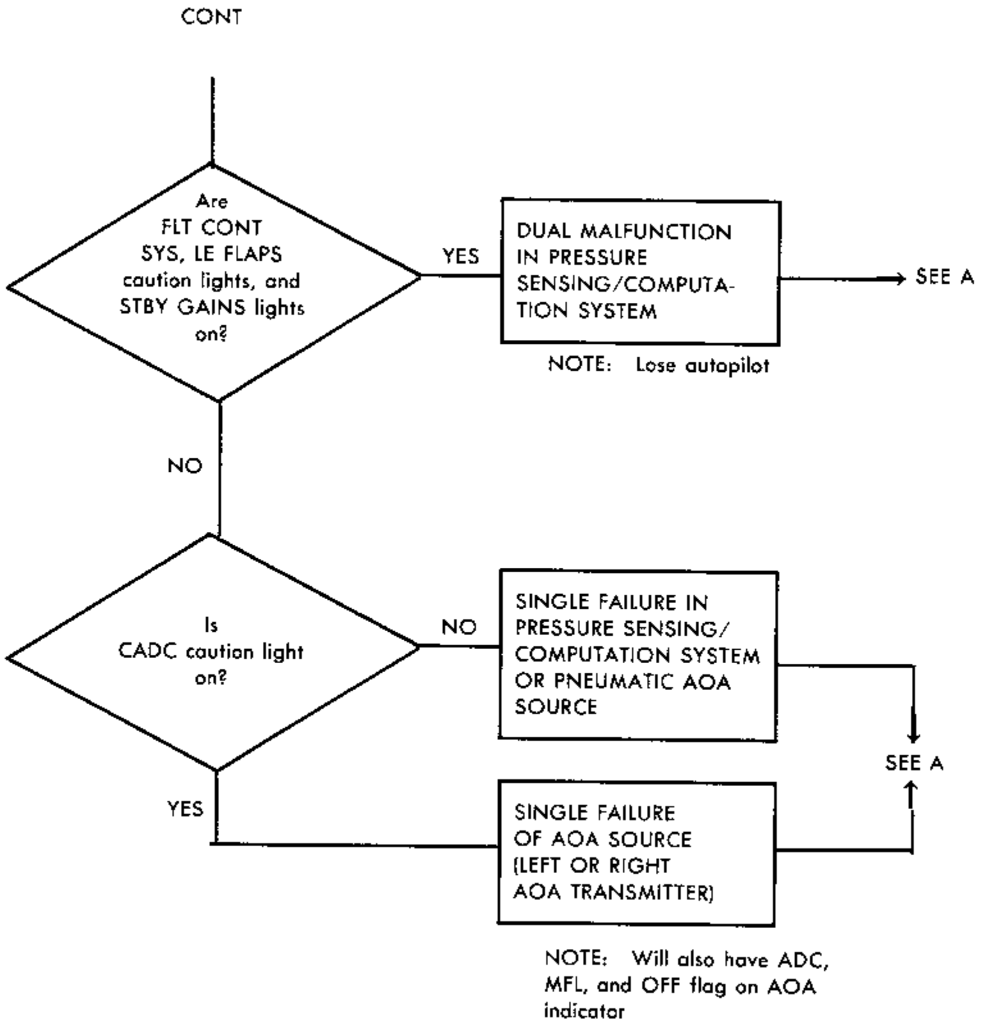


Figure 3-2. (Sheet 3)

Caution Light Analysis

CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
FLT CONT SYS		**NOTE** Depress FCS CAUTION RESET button to clear FLT CONT SYS and MASTER CAUTION lights
Pitch, roll, or yaw located on FLCP (single light)	Single failure in one axis of the FLCS	**A.** Refer to P, R, and Y MALFUNCTIONS
Pitch, roll, and yaw located on FLCP (three lights)	Single branch power failure in FLCS	**B.** Refer to P, R, and Y MALFUNCTIONS
SERVO malfunction light(s) (any) on FLCP	Single servo valve failure	**C.** Refer to SERVO MALFUNCTION
SERVO malfunction lights (all simultaneously) on FLCP	Loss of a hydraulic system or a momentary drop in hydraulic pressure due to large hydraulic flow demands	**D.** Refer to SERVO MALFUNCTION

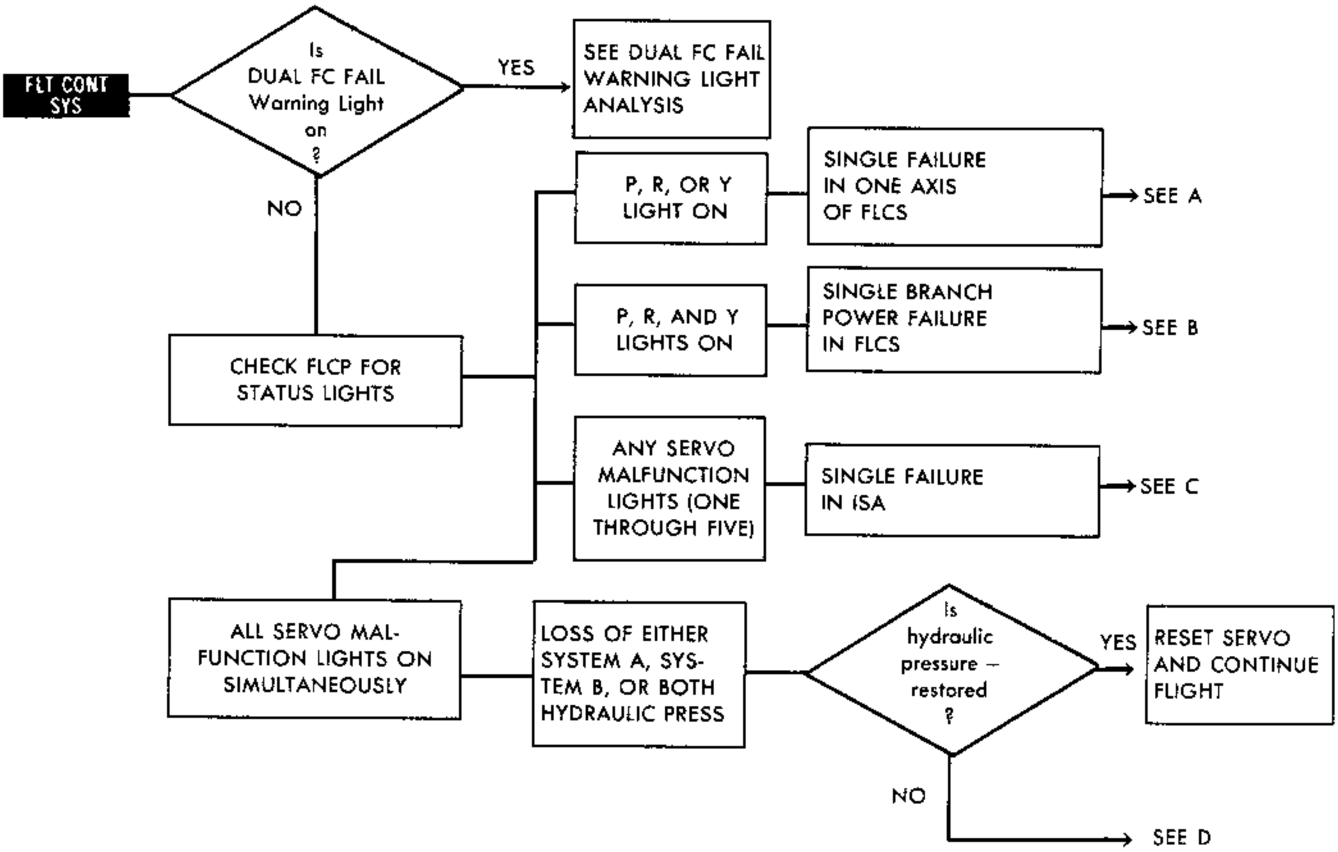
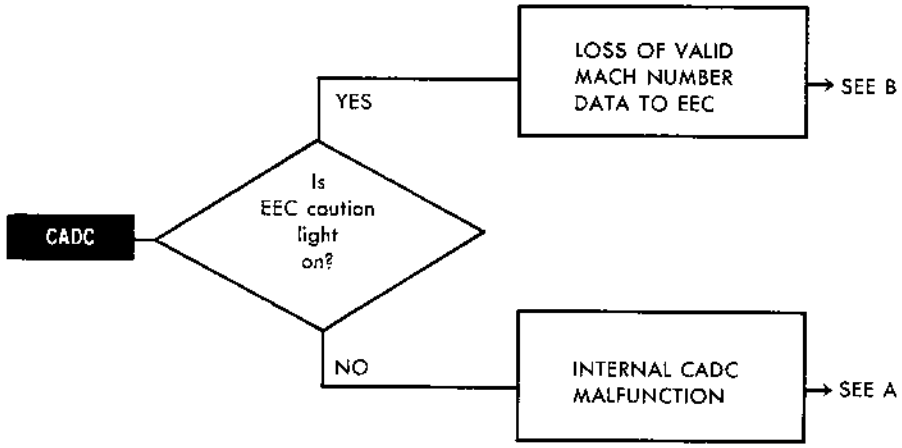


Figure 3-2. (Sheet 4)

Caution Light Analysis

CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
CADC	CADC internal malfunction	**A.** Refer to CADC MALFUNCTIONS
CADC EEC	Loss of valid mach data to EEC	**B.** Refer to EEC CAUTION LIGHT



CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
LE FLAPS	LE FLAPS switch in LOCK One LEF branch has malfunctioned AOA malfunction Standby gains	**A.** LE FLAPS switch – AUTO (no malfunction) **B.** Refer to LEF's MALFUNCTION (SYMMETRIC) **C.** Refer to ADC MALFUNCTIONS

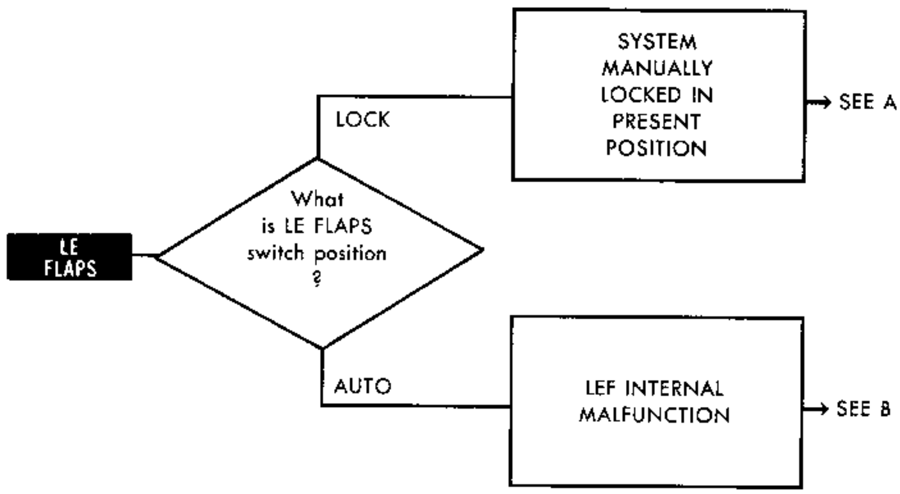


Figure 3-2. (Sheet 5)

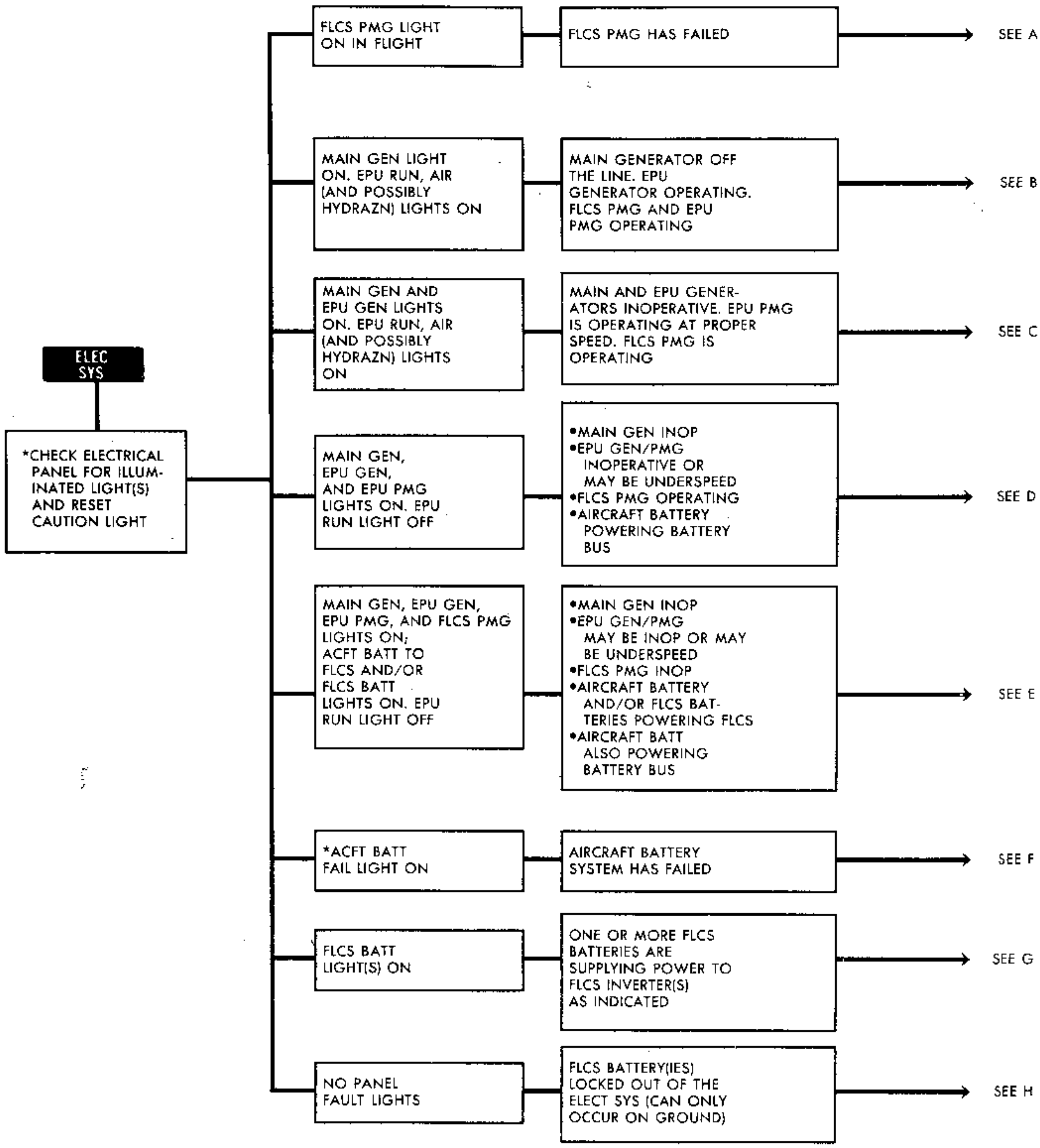
Caution Light Analysis 66

CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
ELEC SYS		
* Check ELEC panel fault lights and reset caution light		
FLCS PMG light (in flight)	FLCS PMG failure	**A.** Refer to FLCS PMG FAILURE 66
MAIN GEN light on and EPU run light on	Main generator failure	**B.** Refer to MAIN GENERATOR FAILURE (IN FLIGHT) **NOTE** If the FFP fails or system A hydraulic pressure is lost, refer to HOT FUEL or GRAVITY FEED
MAIN GEN and EPU GEN lights on and EPU run light off	Failure of both main and EPU generators	**C.** Refer to MULTIPLE GENERATOR FAILURE 66
MAIN GEN, EPU GEN, and EPU PMG lights on. EPU run light off	Failure of main generator and EPU	**D.** Refer to MULTIPLE GENERATOR FAILURE 66
MAIN GEN, EPU GEN, EPU PMG, and FLCS PMG lights on; ACFT BATT TO FLCS and/or FLCS BATT lights on	Failure of all generators	**E.** Refer to MULTIPLE GENERATOR FAILURE 66
* ACFT BATT FAIL light	A malfunction in aircraft battery or battery charging system	**F.** Refer to AIRCRAFT BATTERY FAILURE
* FLCS BATT lights A, B, C, and/or D	One or more of the four FLCS batteries supplying power to inverter(s) as indicated by individual branch lights	**G.** Refer to FLCS BATTERY DISCHARGE 66
No ELEC panel fault lights	One or more FLCS batteries did not connect when main generator came on line (on ground only)	**H.** Notify maintenance

* Certain aircraft battery charging system or FLCS battery system failures can result in a nonresettable ELEC SYS caution light.

Figure 3-2. (Sheet 6)

Caution Light Analysis 66



*Certain aircraft battery charging system or FLCS battery system failures can result in a nonresettable ELEC SYS caution light.

Figure 3-2. (Sheet 7)

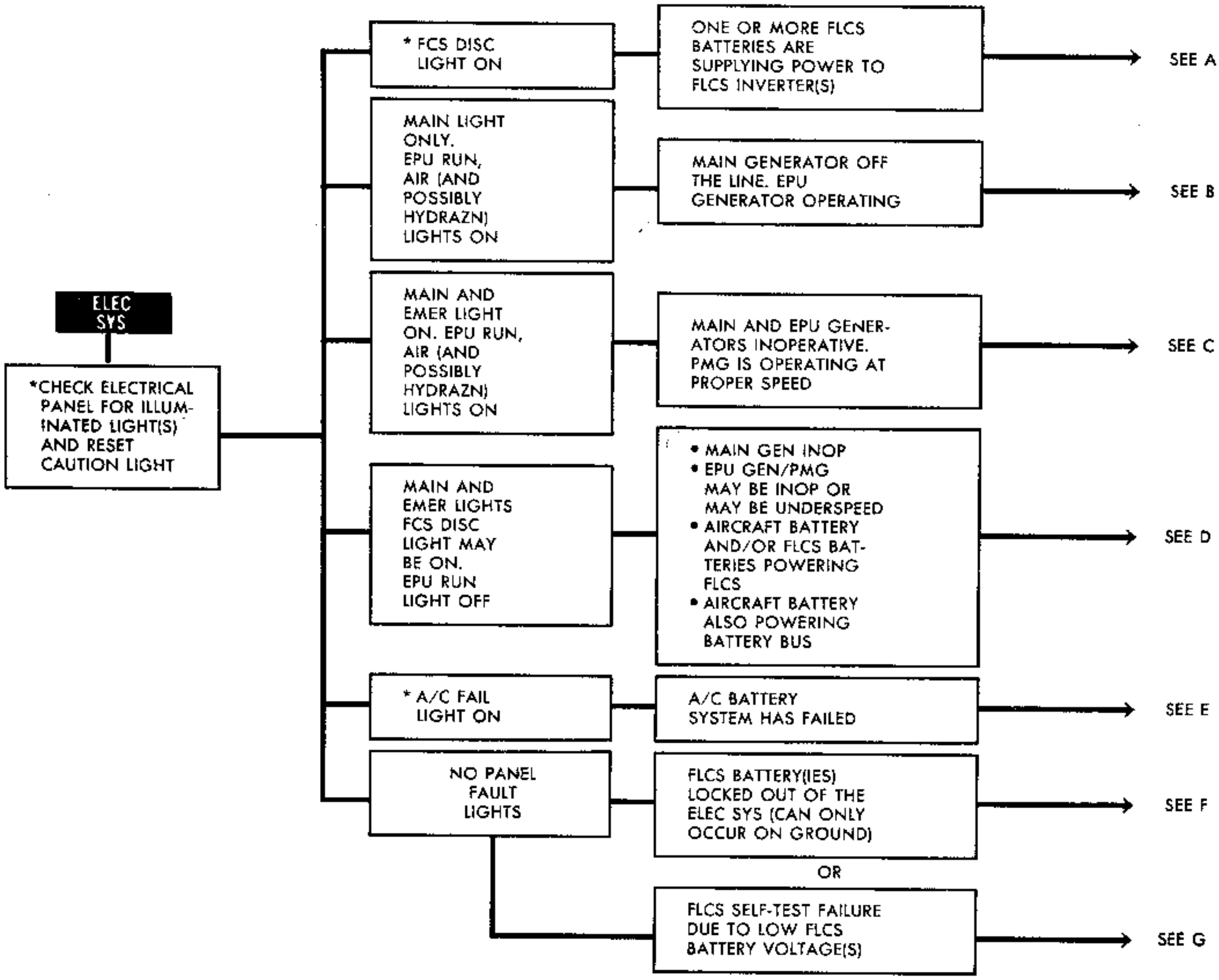
Caution Light Analysis LESS 66

CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
ELEC SYS		
* Check ELEC panel fault lights and reset caution light		
* FCS DISC light	One or more of the four FLCS batteries supplying power to inverter(s)	**A.** Refer to FLCS BATTERY DISCHARGE **LESS 66**
GEN MAIN light on and EPU run light on	Main generator failure	**B.** Refer to MAIN GENERATOR FAILURE (IN FLIGHT) **NOTE** If the FFP fails or system A hydraulic pressure is lost, refer to HOT FUEL or GRAVITY FEED
GEN MAIN and GEN EMER lights on and EPU run light off	Failure of both main and EPU generators	**C.** Refer to MULTIPLE GENERATOR FAILURE **LESS 66**
GEN MAIN, GEN EMER lights on, EPU run light off, FCS DISC light may be on	Failure of all generators	**D.** Refer to MULTIPLE GENERATOR FAILURE **LESS 66**
* A/C FAIL light	A malfunction in aircraft battery or battery charging system	**E.** Refer to AIRCRAFT BATTERY FAILURE
No ELEC panel fault lights	One or more FLCS batteries did not connect when main generator came on line (on ground only)	**F.** Notify maintenance
	or	
	FLCS self-test failure due to low FLCS battery voltage(s)	**G.** Refer to FLCS SELF-TEST, Section II

* Certain aircraft battery charging system or FLCS battery system failures can result in a nonresettable ELEC SYS caution light.

Figure 3-2. (Sheet 8)

Caution Light Analysis LESS 66



*Certain aircraft battery charging system or FLCS battery system failures can result in a nonresettable ELEC SYS caution light.

Figure 3-2. (Sheet 9)

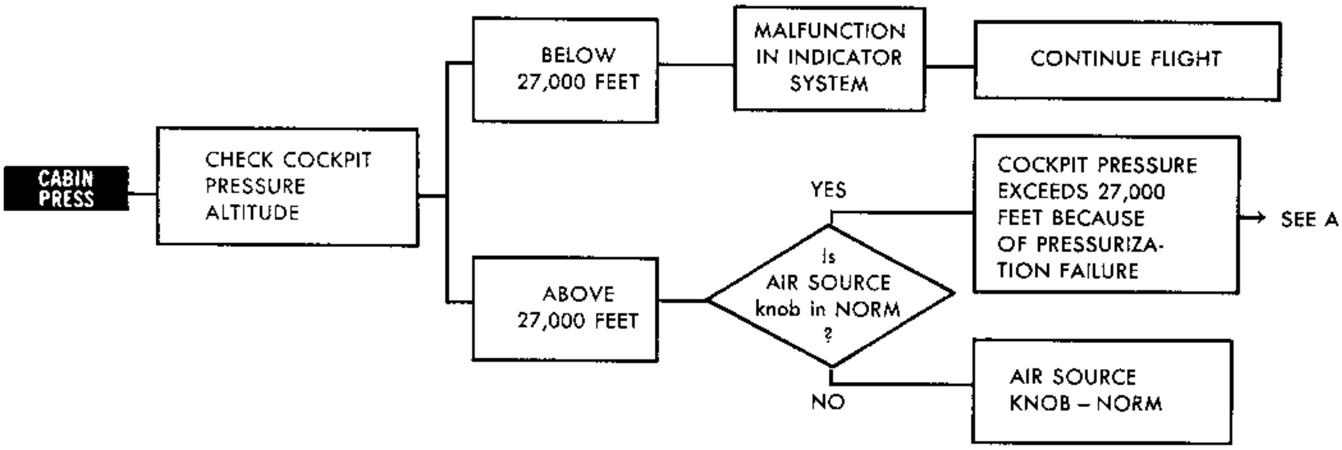
Caution Light Analysis

CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
AVIONICS	Several possible causes. Check display on FCNP	Depress FALT ACK button on FCNP and note fault list display. AVIONICS caution light will reset automatically
SEAT NOT ARMED	Ejection safety lever up (system safed)	When desired, rotate ejection safety lever down (armed)
HOOK	Hook not up and locked	Normal landing, touchdown beyond approach end arresting gear **LESS** 42 The caution light may illuminate during high g maneuvers
NWS FAIL	NWS failure **NOTE:** DOES NOT ILLUMINATE FOR NWS FAILURE DUE TO HYD SYS B FAILURE OR STRUT OVEREXTENSION.	Refer to NWS FAILURE/HARDOVER
BUC	BUC selected and engine operating in BUC or when main fuel pump pressure is low	Refer to ENGINE MALFUNCTIONS
FUEL HOT	Temperature of fuel to engine excessive	Refer to HOT FUEL or GRAVITY FEED
FWD FUEL LOW	Forward fuel tank contains: A Under 400 pounds fuel B Under 250 pounds fuel	Refer to FUEL LOW
AFT FUEL LOW	Aft fuel tank contains: A Under 250 pounds fuel B Under 400 pounds fuel	Refer to FUEL LOW
IFF	Mode 4 sw is OFF; not coded; correct code not selected (A or B); code does not match code interrogation; or mode 4 inoperative	Advisory
NUCLEAR	Malfunction in nuclear control circuitry	Advisory
ECM	Not used	Not used
STORES CONFIG	STORES CONFIG switch is in incorrect position **BLOCK 10** STORES CONFIG switch in CAT I with CAT II stores loading	Position STORES CONFIG switch to match aircraft loading If aircraft is loaded CAT II, the switch may be placed either in CAT I or CAT III. However, if CAT I is selected, the CAT II max bank angle change limits must be observed. (Refer to Section V)

Figure 3-2. (Sheet 10)

Caution Light Analysis

CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
CABIN PRESS	Cockpit pressure altitude above 27,000 feet	**A.** Refer to COCKPIT PRESSURE/TEMPERATURE MALFUNCTION



CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
EQUIP HOT	Avionics equipment cooling air temperature/pressure insufficient	**A.** Refer to EQUIP HOT CAUTION LIGHT

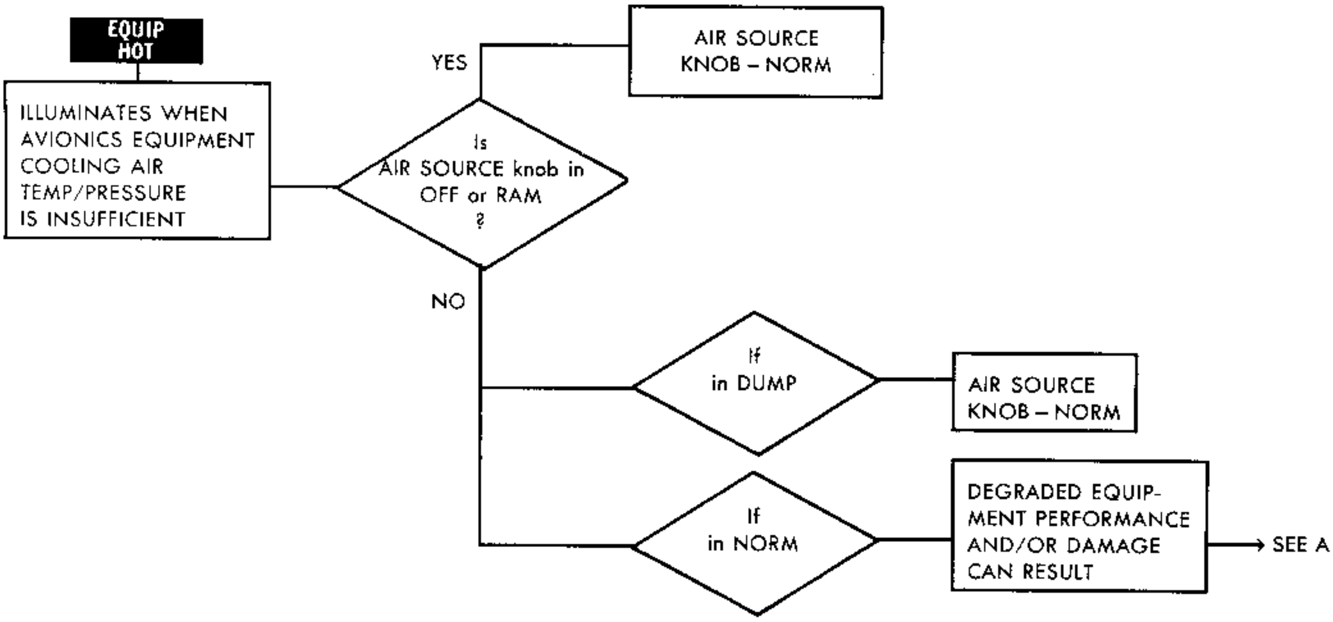


Figure 3-2. (Sheet 11)

Caution Light Analysis

CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
OVERHEAT	Engine compartment, wheelwell, ECS bay, or EPU bay overheated	**A.** Refer to OVERHEAT CAUTION LIGHT

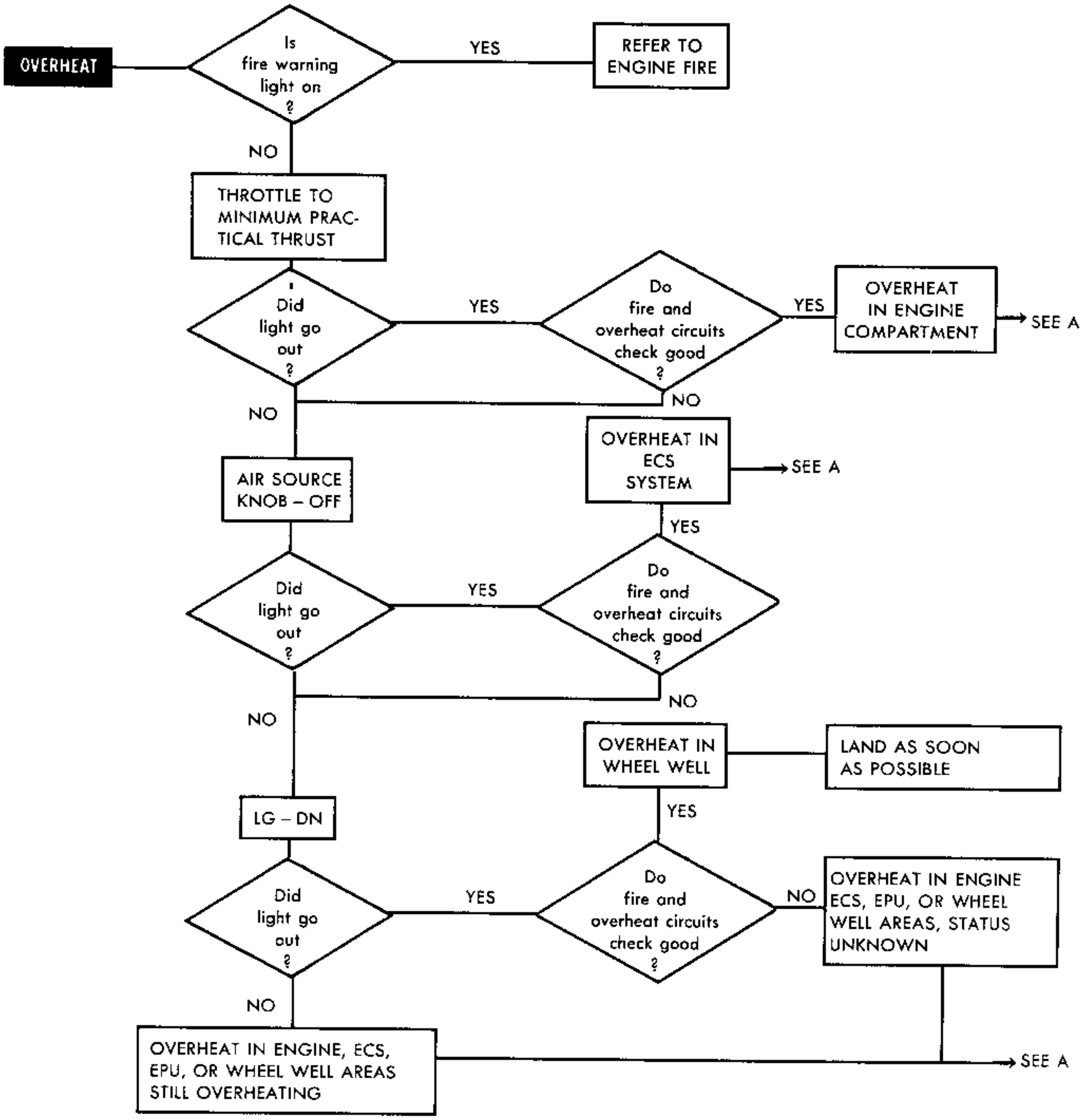
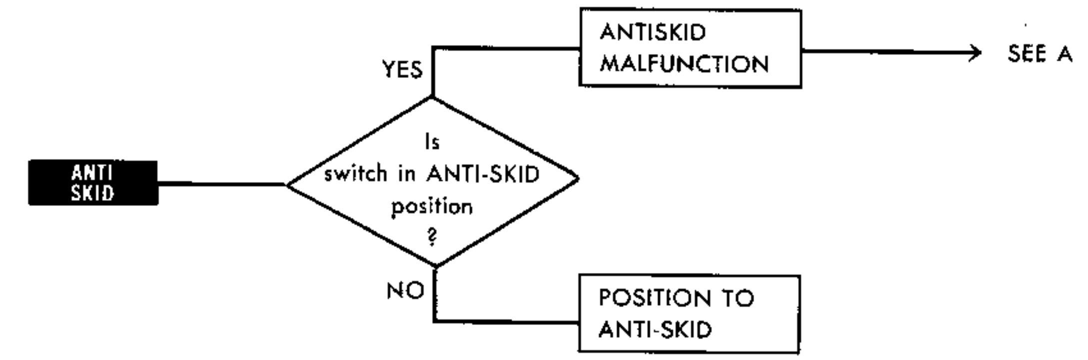


Figure 3-2. (Sheet 12)

Caution Light Analysis

CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
ANTI SKID	ANTI-SKID switch OFF or system malfunction	For the antiskid malfunction condition, braking pressure will pulsate if applied. If steady braking pressure is desired, release brakes and then position ANTI-SKID switch OFF. Apply manual braking cautiously when ANTI-SKID switch is OFF



ATF NOT ENGAGED 46	Not used	Self-explanatory
RADAR ALT 46	Not used	Self-explanatory
OXY LOW	Oxygen pressure is below 42 psi or quantity is below 0.5 liter	**A.** Descend to 10,000 feet cockpit pressure altitude. Use EMERGENCY oxygen if required

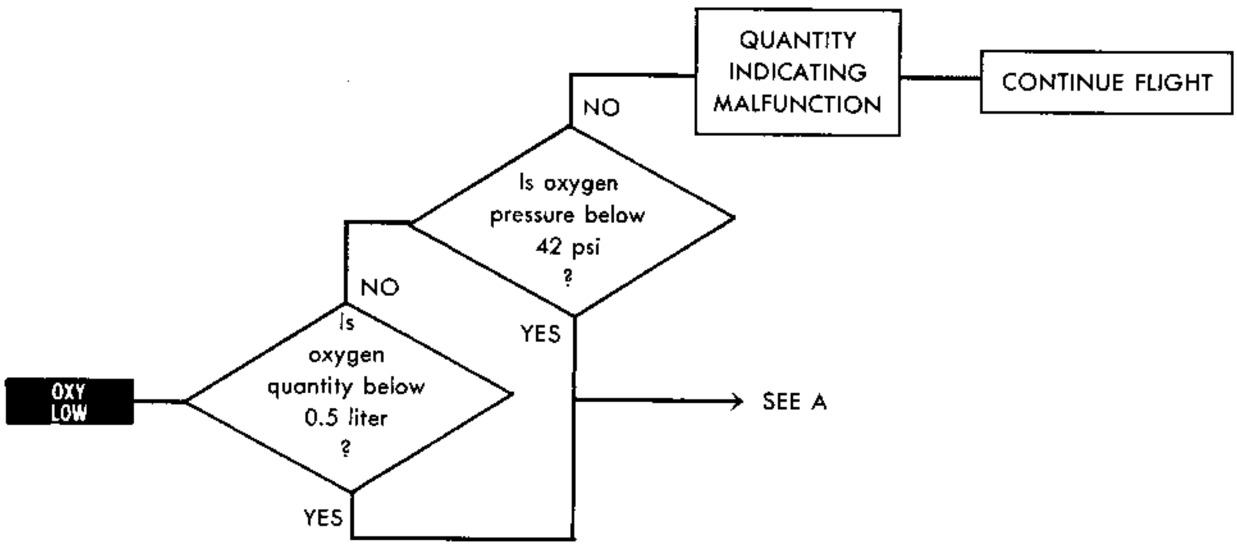


Figure 3-2. (Sheet 13)

Caution Light Analysis

CAUTION LIGHT	CAUSE	CORRECTIVE ACTION/REMARKS
EEC	Engine alternator failed Loss of valid mach data from CADC or EEC malfunction	**A.** Refer to ZERO RPM **B.** Refer to EEC CAUTION LIGHT

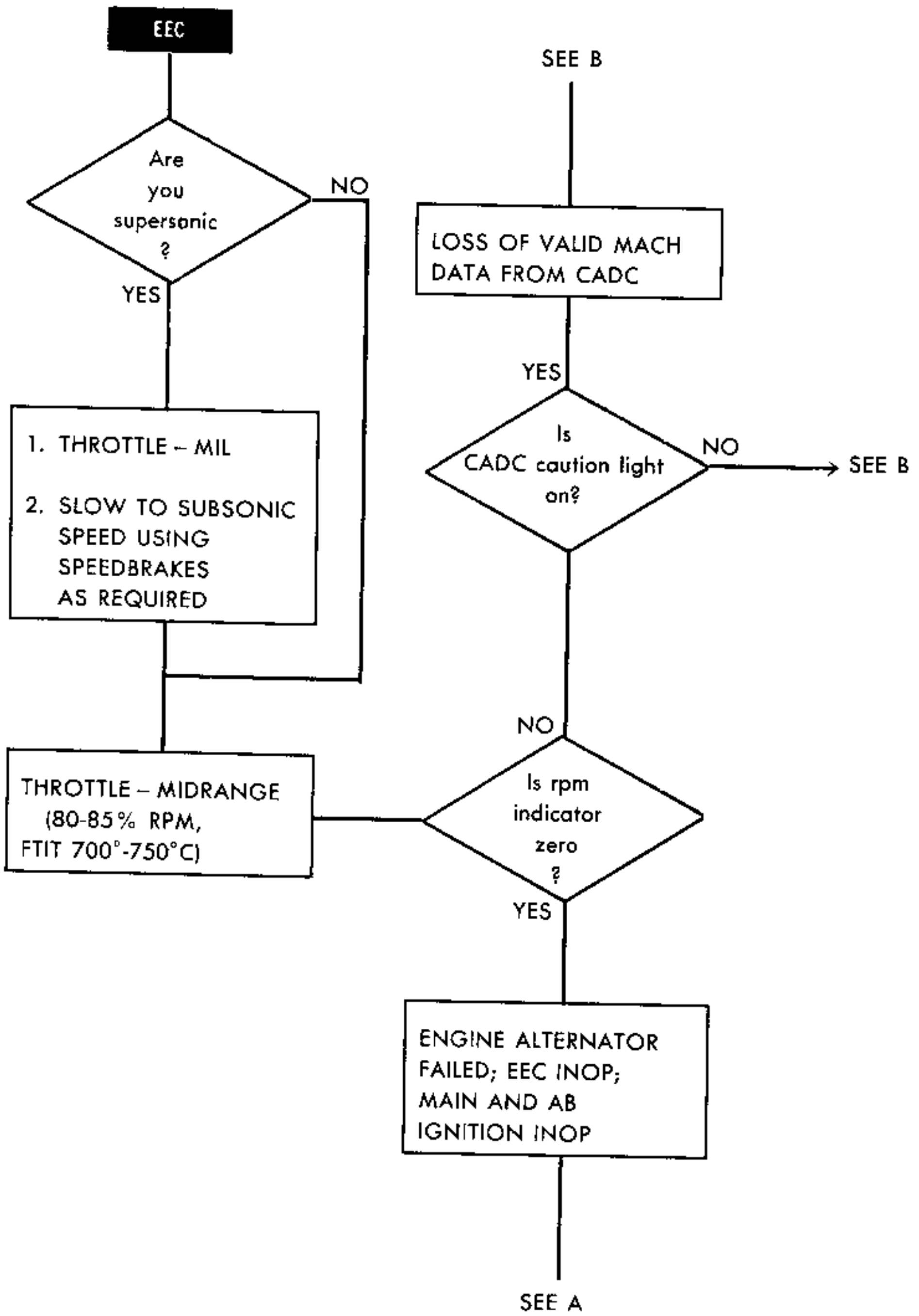


Figure 3-2. (Sheet 14)

FORMAT

The format of Emergency Procedures differs slightly between the Checklist and the Flight Manual. Procedures in the Checklist have been grouped by malfunction category (engine, electrical, etc.) to provide maximum in-flight utility. In the Flight Manual, procedures are listed by the phase of flight in which the emergency may occur. In the Checklist, some procedures are split into two independent side-by-side series of steps and are separated by a straight line; in the Flight Manual, these side-by-side steps appear in a continuous column and can be identified by repeat numbering of steps following conditional statements beginning with the word if. Amplification following procedural steps in the Flight Manual is repeated in the Checklist under the headings: inoperative equipment, other indications, or other considerations.

A thorough review of the layout and content of the Checklist and Flight Manual is recommended prior to in-flight use.

GROUND EMERGENCIES

FIRE/OVERHEAT/FUEL LEAK (GROUND)

An engine or JFS fire/overheat can be detected by flames, smoke, explosion, signal from ground crew, or radio call. FTIT may exceed 680°C and, if ac power is available, ENG FIRE or OVERHEAT caution light may illuminate.

1. Throttle – OFF.
2. JFS switch – OFF.
3. FUEL MASTER switch – OFF.
4. ENG FEED knob – OFF (If external power applied).

If fire continues:

5. Abandon aircraft.

HOT START (GROUND)

Hot start – FTIT over 680°C. During engine start, if the FTIT increases at an abnormally rapid rate through 575°C, a hot start can be anticipated.

1. Throttle – OFF.
2. FTIT indicator – Monitor.

If FTIT remains above 500°C:

3. JFS switch – START 2.
   Motor engine with JFS until FTIT is below 200°C.

HUNG START/NO START

Hung start – RPM has stopped increasing below IDLE and FTIT is stabilized at less than 680°C.

No start – Light-off does not occur within 15 seconds.

1. STARTING FUEL switch – RICH (5 seconds).

If condition persists:

2. Throttle – OFF.

BRAKE MALFUNCTIONS

Malfunctions in systems which affect normal braking are described in the emergency procedure which addresses each specific system. One of the brake failure modes is the loss of one brake circuit. With this failure, both brakes are still available; however, significantly more pedal force than normal will be required to achieve a specific braking effectiveness. Another failure mode is loss of brakes on one or both MLG. Changing brake channels may return the system to normal operation. Turning the ANTI-SKID switch to OFF may also restore braking; however, the system will revert to manual control and antiskid protection will be lost. (66 Status of the power source for toe brake transducers can be determined by testing the FLCS PWR lights on the test switch panel (figure 1-6).) Release brake pedal pressure before changing channels or turning off the ANTI-SKID to avoid immediate brake lockup if braking returns. When moving the ANTI-SKID switch, be very careful not to select the PARKING BRAKE unless that is what is intended. If directional control is a problem (such as, with one brake inoperative on landing roll), do not hesitate to use NWS. Lower hook if a cable is available. If normal brakes cannot be restored, do not hesitate to use the parking brake if a cable is not available. The lower the groundspeed, the less chance there is of aircraft damage when using the parking brake. If the aircraft is accelerating, use the parking brake early. It may be possible to cycle the parking brake on and off and

stop the aircraft; however, regardless of technique, use of the parking brake may result in blown tires.

Accomplish as many steps as required:

1. BRAKES switch – Change channels.

CAUTION

Release brakes prior to changing brake channels or turning antiskid off.

2. ANTI-SKID switch – OFF.

CAUTION

Release brakes prior to changing brake channels or turning antiskid off.

3. NWS – Engage (If required).

4. NO Drag chute – Deploy.

5. HOOK switch – DN.

If arresting cable is not available or if at low groundspeed:

6. ANTI-SKID switch – Intermittent PARKING BRAKE, then ANTI-SKID.

CAUTION

If in a congested area, use the parking brake immediately to stop.

HOT BRAKES

Perform the following after any event which requires excessive braking (e.g., aborted takeoff, landing at high GW's, landing with higher than normal idle thrust, etc.) or when hot brakes are suspected (smoking brakes, ground crew confirmation, etc.):

1. Request firefighting equipment and proceed directly to the designated hot brake area or nearest area clear of other aircraft and personnel.

WARNING

Any leaking hydraulic fluid may be ignited by hot wheel and brake surfaces. Wheel fusible plugs may relieve tire pressure within 15 minutes after stop.

When in the hot brake area:

2. Align aircraft with nose into wind if possible.

3. Use only chocks, if available, or minimum possible toe brake pressure to hold aircraft stationary until engine is shut down.

WARNING

Do not use the parking brake.

4. Delay engine shutdown until arrival of firefighting equipment.

WARNING

Hot wheels and brakes may ignite fuel drained overboard during engine shutdown.

If a brake fire occurs:

5. Refer to GROUND EGRESS, this section.

MAIN GENERATOR FAILURE (GROUND)

66 If the main generator fails on the ground, the FLCS PMG and aircraft battery provide power for full normal braking (both channels). If the EPU fails to operate, NWS will be inoperative.

LESS 66 If the main generator fails on the ground, the EPU should activate to provide normal braking and NWS. If the EPU fails to operate, the NWS will be inoperative and the FLCS batteries and aircraft battery will supply electrical power for brake application as follows:

- 48 Full normal toe brakes (both channels) are available.
- LESS 48 Only half of the brake pucks are powered, and significantly more brake pedal

force than normal will be required to stop the aircraft.

- The aircraft battery is an alternate power source for the FLCS inverters. Although the FLCS batteries can be disconnected if the MAIN PWR switch is moved out of MAIN PWR, 56 or the canopy is partially opened, or **LESS** 56 the canopy is unlocked, the aircraft battery will power the inverters for toe brake operation.

Stop and set the parking brake prior to attempting to reset the generator.

If main generator resets and further taxiing is required, brakes should be checked carefully. Allow the aircraft to begin rolling slowly and check for normal braking. If normal braking is inoperative, immediately reapply the parking brake.

1. Stop the aircraft.
   Turn EPU on, if required, to obtain NWS and **LESS** 48 full braking.

2. Parking brake - Set.

3. OXYGEN - 100%.

4. EPU switch - OFF.

If further taxiing is required:

5. MAIN PWR switch - BATT, then MAIN PWR.
   Toe brakes and parking brake are available with or without the EPU as long as the MAIN PWR switch is not moved to OFF.

CAUTION

If main generator cannot be reset, NWS will be inoperative unless the EPU is activated.

EMERGENCY ENTRANCE

Refer to figure 3-3 for emergency entrance and crew rescue procedures.

EMERGENCY GROUND JETTISON

Ground jettison of the 300/370-gallon fuel tanks will result in the tank(s) striking the ground before the pylon aft pivots release. The tank(s) will probably rotate horizontally and may strike the LG. Use EMER STORES JETTISON on the ground only as a last resort. Refer to EMERGENCY JETTISON, this section.

GROUND EGRESS

The order of accomplishment of ground egress steps depends on the nature of the emergency. For quickest ground egress (without jettisoning the canopy), place the canopy switch up and then prepare for exit while the canopy is opening. However, if fire or danger of explosion exists, accomplish steps necessary for egress prior to opening canopy to retain maximum protection until ready for exit. Disconnect parachute risers, lapbelt, and survival kit. Oxygen, G-suit, and communication leads are quick-disconnect. If required, the canopy can be jettisoned even after it has been partially opened. If the canopy is restrained by debris or jammed by crash damage, attempted jettison may result in a portion of the canopy rocket exhaust entering the cockpit. This exhaust does not present a heat or blast hazard in the cockpit; however, toxic gases will be present and 100 percent oxygen with the regulator set in EMERGENCY should be used.

1. Throttle - OFF.

CAUTION

LESS 72 If the LG is not pinned, the LG may retract when the main generator drops off the line during engine shutdown. This uncommanded retraction can be avoided by pulling the ALT GEAR handle prior to engine shutdown. This procedure should only be used when an emergency situation requires immediate ground egress and/or the LG cannot be pinned.

2. Seat - Safe.

3. Harness and personal equipment - Release.

4. EPU switch - OFF (Time permitting).

WARNING

Exit over the left side (conditions permitting) to avoid EPU exhaust gases.

Emergency Entrance and Crew Rescue

NORMAL

1. If time and conditions permit:

a. 75 Insert 1/4-inch drive socket wrench or breakover bar into canopy lock access plug and rotate ccw to remove plug

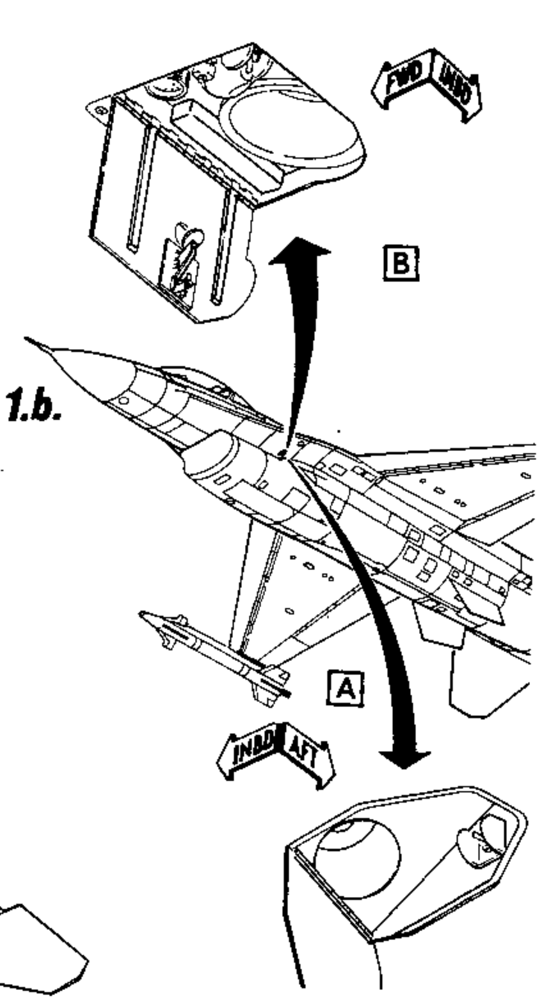
b. 75 Insert 10-inch or longer piece of number 25 drill rod (or 1/8-inch rod) into opening and push inboard to unlock canopy

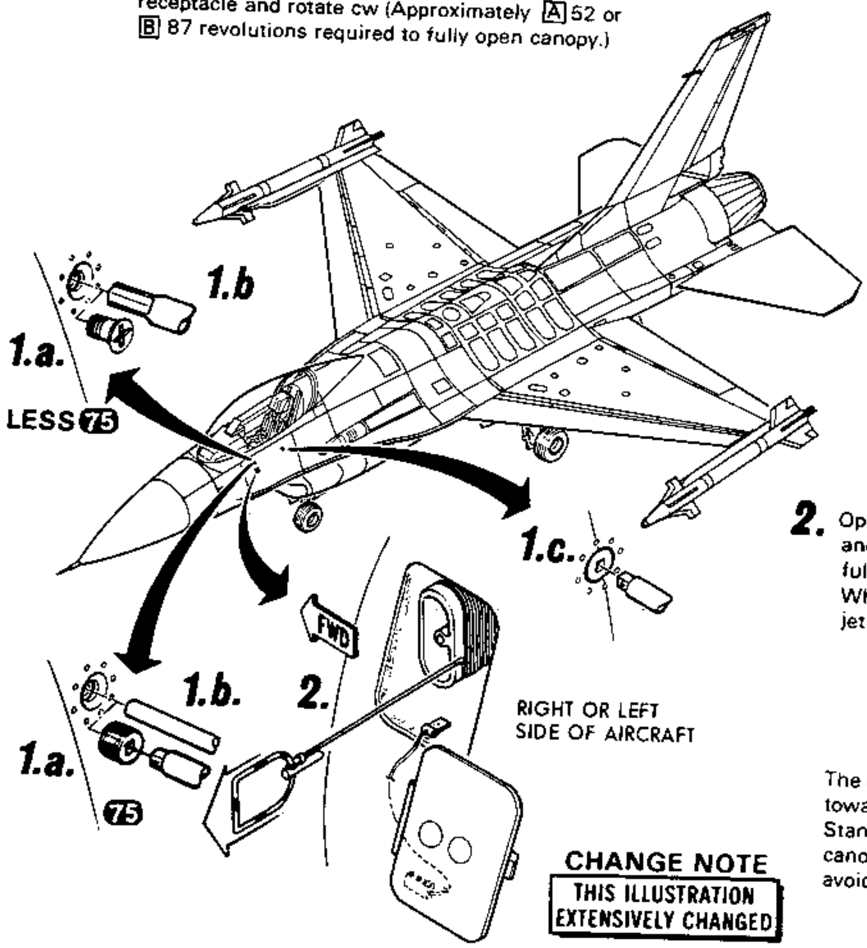
a. **LESS** 75 Using an apex-head screwdriver, remove plug (CCW).

b. **LESS** 75 Insert 10-inch or longer screwdriver in opening and push inboard to unlock canopy.

NOTE: Positioning the external canopy switch to [A] up or [B] aft prior to unlocking the canopy will overheat canopy actuator and pop the circuit breaker.

c. If canopy still is not open, insert 1/4-inch drive socket wrench or breakover bar into external canopy hand crank receptacle and rotate cw (Approximately [A] 52 or [B] 87 revolutions required to fully open canopy.)





EMERGENCY

2. Open the canopy emergency release door and move canopy jettison handle out to full length of cable (approximately 6 feet). When the cable tightens, pull handle hard to jettison the canopy.

WARNING

The canopy jettisons upward and back toward the vertical tail with great force. Stand to the side and slightly aft of canopy to full length of the cable to avoid canopy rocket blast.

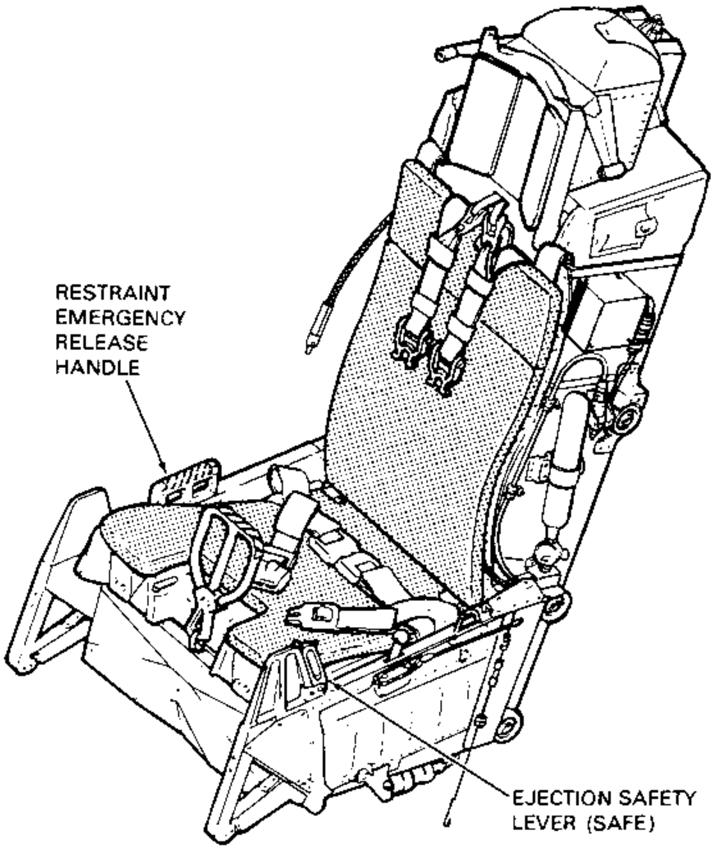
CHANGE NOTE
THIS ILLUSTRATION
EXTENSIVELY CHANGED

1F-16Y-1-0119

Figure 3-3. . (Sheet 1)

Emergency Entrance and Crew Rescue

EMERGENCY RESCUE



WARNING

To prevent possible seat ejection during rescue, rotate the ejection safety lever up as shown in step 3.

3. Rotate ejection safety lever located on left of seat to full up (vertical) position.

4. Disconnect crewmember from lapbelt, survival kit straps and parachute risers.

NOTE: The RESTRAINT EMERGENCY RELEASE handle effects release from the lapbelt and inertia reel harness but not the parachute risers and survival kit straps

1F-16X-1-0120

Figure 3-3. (Sheet 2)

5. Canopy – Open.

WARNING

- [B] Consider canopy jettison so rear seat occupant can egress more rapidly.
- Opening the canopy with the hand-crank is extremely difficult. If immediate egress is required, the canopy should be jettisoned rather than opened with the handcrank.

If canopy will not raise:

6. OXYGEN – 100%.

WARNING

If jettison is unsuccessful, toxic gas from the rockets may enter the cockpit.

7. Canopy – Jettison.

WARNING

Pulling the CANOPY JETTISON T-handle other than straight up may cause the handle to jam.

HOT REFUELING EMERGENCY

In the event of a fire or fuel leak/spill while refueling in hot pit area, refer to FIRE/OVERHEAT/FUEL LEAK (GROUND), this section. In the event of fire in the area of refueling operation (other than in the hot pit area), have the refueling operation discontinued and taxi clear.

HYDRAZINE LEAK

If a hydrazine leak is detected while the engine is running:

1. OXYGEN – 100%.
2. Taxi to designated, isolated parking area (If required).
3. Insure all nonessential personnel are clear.
4. EPU switch – OFF.
5. EPU safety pin – Installed.
6. Shut down engine (after chocks and LG pins are installed).

NWS FAILURE/HARDOVER

NWS failure may be detected by the NWS FAIL caution light or uncommanded NWS inputs with no caution light. If NWS FAIL caution light is on, do not engage NWS. If the strut is overextended, the NWS may not engage even though the engage light is on and the fail light is off.

NOTE

If NWS is inoperative and there is no NWS FAIL caution light illuminated, the dc No. 1 bus may have failed.

1. NWS – Disengage.
2. NWS engage light – Verify off.
3. Rudder and brakes – As required.

TAKEOFF EMERGENCIES

ABORT

The decision to abort or continue takeoff depends on many factors. Considerations should include, but not be limited to, the following:

- Runway factors: Runway remaining, surface condition (wet, dry, etc.), type and/or number of barriers/cables available, obstructions alongside or at the departure end, wind direction and velocity, and weather and visibility.
- Aircraft factors: GW, stores, nature of the emergency, velocity at decision point, and importance of becoming airborne.
- Stopping factors: Maximum antiskid braking, speedbrakes, aerodynamic braking, hook, and [NO] drag chute.

CAUTION

- At high speed (no WOW), forward stick pressure in excess of approximately 2 pounds will result in full horizontal tails trailing edge down. This will cause excessive loads on the NLG which can lead to nose tire failure and possible structural failure of the NLG.

- Failure to use full antiskid braking or applying brakes with engine above idle thrust significantly increases the wheel brake temperature and probability of a wheel brake fire.

Consider aborting after becoming airborne in those situations where sufficient runway is available. Normally, with the short takeoff distances of the aircraft, abort is not a problem but an early decision will provide the most favorable circumstances. After the nosewheel is on the runway, maintain full aft stick, open the speedbrakes fully, and use maximum wheel braking (antiskid on). NWS should be engaged if directional control is a problem. If there is any doubt about the ability to stop on the remaining runway, lower the hook.

WARNING

- When braking absorbs a high amount of energy, do not shut down engine until firefighting equipment is available.

- Hot wheels and brakes may ignite fuel drained overboard during engine shutdown or leaking hydraulic fluid. Wheel fusible plugs may relieve tire pressure within 15 minutes after stop.

1. Throttle – IDLE.

WARNING

When the throttle is retarded to IDLE from MAX AB, the thrust and rpm decay to idle can take up to 2-4 seconds. Do not mistake high thrust/rpm for failure of the engine to respond to the idle command. Engine shutdown from MAX AB will probably result in a tailpipe fire.

2. NO DRAG CHUTE switch – DEPLOY.

3. HOOK switch – DN (If required).

   - The hook should be lowered at least 1000 feet from the cable to allow adequate time for hook to stabilize and for full holddown force to be developed by the hook actuator.

   - Refer to CABLE ARRESTMENT, this section.

If on fire:

4. Throttle – OFF.

NOTE

With engine shut down, NWS is lost, and EPU will not activate as the main generator drops off the line. After hydraulic pressure drops, braking will be available using the brake/JFS accumulators only. Stop straight ahead and set parking brake. **LESS** 48 Significantly more brake pedal force than normal will be required.

ENGINE FAILURE ON TAKEOFF

Engine failure shortly after liftoff will usually not permit time for analysis or corrective action. The primary concern should be to trade any excess airspeed for altitude and to eject prior to allowing a sink rate to develop. Jettisoning stores may aid in gaining altitude but must not delay the ejection decision. If the failure occurs later in the takeoff phase, time may be available for analysis or corrective action.

If conditions permit:

1. Abort.

If conditions will not permit an abort:

1. Zoom.

2. Stores – Jettison (If possible).

3. Eject.

AB FAILURE ON TAKEOFF

An AB failure can be detected by a thrust loss and nozzle closure or failure of AB to light within 5

seconds. If possible, abort the takeoff since an AB failure may indicate other/engine problems. If takeoff is continued, the throttle should be retarded to MIL. AB operation should not be reattempted unless required.

If decision is made to stop:

1. Abort.

If takeoff is continued:

1. Throttle – MIL.

2. Stores – Jettison (If required).

LOW THRUST ON TAKEOFF

Low thrust during takeoff can be the result of EEC related failures, the nozzle failing to close, or an rpm rollback. These situations may result in significant thrust loss and the inability to take off or maintain level flight. Low thrust during a MIL takeoff can also be the result of the start bleed strap failing to close during the normal start cycle. At stabilized MIL (approximately 5 seconds), this failure is indicated by a nozzle position of 30 percent or greater. If this occurs during takeoff and conditions permit, the takeoff should be aborted. If the takeoff must be continued and MIL thrust is not sufficient, turn the EEC BUC switch to OFF. If thrust is still insufficient, AB should be used. However, an excessively open nozzle may reduce the chance for successful AB light. If the AB does not light, the throttle should be placed to MIL and the EEC BUC switch placed to BUC. Because the BUC bypasses the UFC and many of its inputs, engine thrust should increase. If thrust is still low, consideration must be given to jettisoning stores.

If already in AB when thrust becomes insufficient, turn the EEC BUC switch to OFF.

If decision is made to stop:

1. Abort.

If takeoff is continued and thrust is insufficient:

1. EEC BUC switch – OFF.
   EEC BUC switch may be turned off in MIL or AB.

If thrust is still insufficient:

2. Throttle – AB.
   The chances for a successful AB light with the nozzle open more than 30 percent are reduced.

If thrust is still insufficient:

3. Throttle – MIL.

4. EEC BUC switch – BUC.

5. Stores – Jettison (If required).

ENGINE FIRE ON TAKEOFF

An engine fire may be indicated by the ENG FIRE warning light, high FTIT, smoke, or fumes. Refer to ENGINE FIRE, this section.

LG FAILS TO RETRACT

If the LG warning light remains on after the LG handle is placed to UP, the LG or LG doors are not fully up and locked.

1. Airspeed – 300 knots maximum.

2. LG handle – DN.

If LG comes down normally:

3. GW – Reduce prior to landing.

If LG does not indicate down and locked:

CAUTION

Do not cycle LG handle. Damage to LG or LG doors may result.

4. Go to ALTERNATE LG EXTENSION, this section.

LG HANDLE WILL NOT RAISE

If the left MLG WOW switch fails to the ground position, the LG handle will not move out of the DN position; in addition, the air data system, LG system, T.O./LAND CONFIG warning light, and touchdown skid control system will be affected. The LG handle may be raised by first depressing the LG handle downlock release button.

If conditions permit:

1. Airspeed – 300 knots maximum.

2. GW – Reduce prior to landing.

If LG must be raised:

1. LG handle DN LOCK REL button – Depress.

2. LG handle – UP.
   T.O./LAND CONFIG light will be on if left MLG WOW switch has failed.

3. PROBE HEAT switch – Check PROBE HEAT.

When desired:

4. LG handle – DN.

After touchdown:

5. Brakes – Apply after wheels have spun up.

CAUTION

Touchdown antiskid protection is not available. Landing with feet on the brake pedals may result in blown tire(s).

BLOWN TIRE

Tire failure on takeoff is difficult to recognize and may not be noticed in the cockpit. Aborting takeoff at high speed with a blown tire may be more dangerous than continuing takeoff. For heavy weight takeoffs, an abort at high speed with a blown tire is extremely dangerous because braking and directional control are impaired and runway remaining may be short. If takeoff is continued, do not retract the LG, reduce GW if practical, and prepare to land as soon as practical.

When landing with a blown tire on a dry runway, directional control is normally not a problem. A normal approach and landing is preferred over an approach-end arrestment. Reduce GW for all blown tire landings. Departure-end arrestment is recommended if stopping distance is critical. However, an approach-end arrestment should be considered only when directional control may be a problem (e.g., crosswind).

If the blown tire is on the MLG, leave antiskid on to minimize possibility of skidding the good tire during landing. Land on the side of runway away from the blown tire. If the wheel with the blown tire does not turn after landing, the antiskid will switch to the pulsating antiskid mode. Use roll control to relieve pressure on the blown tire and NWS to maintain directional control.

If the blown tire is on the NLG, hold the nosewheel off the runway and use two-point aerodynamic braking until control effectiveness begins to decay. Lower the nosewheel to the runway and maintain directional control using rudder and differential braking.

Stop straight ahead and shut down the engine as soon as firefighting equipment is available. Do not attempt to taxi unless an emergency situation exists.

If on takeoff and conditions permit:

1. Abort.

If takeoff is continued:

1. LG – Do not retract.

2. GW – Reduce (If practical).

Prior to landing:

NOTE

Land on side of runway away from blown tire.

3. TANK INERTING switch – TANK INERTING.

4. ANTI-SKID switch – ANTI-SKID.
   Use of antiskid will minimize skidding on good tires during braking.

5. HOOK switch – As desired.
   Departure-end arrestment recommended if stopping distance is critical. An approach-end arrestment should be considered only when directional control may be a problem (e.g., crosswind).

After touchdown:

NOTE

Attempt to reduce weight on blown tire.

6. NO Drag chute – Deploy.

7. NWS – Engage (If required).

8. Brakes – As desired on good tire(s).

IN-FLIGHT EMERGENCIES

CANOPY WARNING LIGHT ON

1. Canopy handle – Push outboard.

If light remains on:

2. Go to CANOPY LOSS IN FLIGHT, this section.

CANOPY LOSS IN FLIGHT

Canopy loss in flight will result in disorientation and may result in structural damage caused by the canopy striking the aircraft. Slow to 180 knots or less and check for controllability. Wind blasts up to 180 knots can be coped with by leaning forward and down behind the glareshield and HUD. Due to wind blast, it may be necessary to hold the helmet down.

WARNING

Arms must be kept close to the body to avoid letting wind blast pull arms out of the cockpit.

Wind buffet increases slightly with increased AOA. Therefore, if fuel is not critical, TEF's should be extended using the ALT FLAPS switch or by lowering the LG.

1. Airspeed – 180 knots maximum.

2. Seat – Full down.

3. TEF's – Extend.

4. Land as soon as possible.

DRAG CHUTE DEPLOYED IN FLIGHT $\boxed{\text{NO}}$

If the drag chute is deployed in flight below 190 knots:

NOTE

If the drag chute is deployed below approximately 190 knots, it will not break away from the aircraft.

1. DRAG CHUTE switch – REL.

If the drag chute does not release:

2. Throttle – MAX AB.

COCKPIT PRESSURE/TEMPERATURE MALFUNCTION

Loss of cockpit pressurization could be caused by canopy seal, air-conditioning system, or cockpit pressure regulator safety valve malfunctions or ECS shutdown or failure.

Certain ECS equipment malfunctions can result in temporary shutdown of the ECS. These shutdowns are more prevalent at high altitude during low speed flight with high engine thrust settings. An ECS shutdown will be characterized by an oily, smokey smell, followed by loss of cockpit noise, airflow, and gradual loss of pressurization. These temporary shutdowns will typically last from 20-45 seconds or, on occasion, up to 2 minutes. The EQUIP HOT caution light will likely illuminate if the shutdown lasts longer than 20 seconds.

Most AUTO position temperature failures can be corrected by use of the MAN position.

If cockpit pressure altitude exceeds 27,000 feet, the CABIN PRESS caution light will illuminate.

If the cockpit temperature is excessive and does not respond to normal or manual temperature commands or cockpit pressure is lost, proceed as follows:

1. OXYGEN – 100%.

2. Altitude – 25,000 feet maximum.

3. Airspeed – 500 knots maximum.

4. AIR SOURCE knob – OFF (10-15 seconds), then NORM.

If cockpit pressure is not regained:

5. Land as soon as practical.

If cockpit temperature control is not regained:

5. AIR SOURCE knob – OFF.

6. AIR SOURCE knob – RAM (After cockpit is depressurized).

NOTE

External fuel cannot be transferred in OFF or RAM. Consider jettisoning tanks to decrease drag if range is critical and ECS cannot be turned on for short periods to transfer fuel.

7. Nonessential electrical equipment – Off.

NOTE

If in VMC and the ADI and HSI are not required for flight, the INS should be considered nonessential.

8. Land as soon as practical.

9. Check for failed dc bus. Refer to EMERGENCY POWER DISTRIBUTION, this section.

EQUIP HOT CAUTION LIGHT

1. DEFOG lever – 3/4 forward.

2. Throttle – 80 percent rpm (In flight).

If light remains on after 1 minute:

3. Nonessential avionics – Off.

NOTE

If in VMC and the ADI and HSI are not required for flight, the INS should be considered nonessential.

4. Land as soon as practical.

EJECTION

Ejection should be accomplished at the lowest practical airspeed.

WARNING

- Do not pull RESTRAINT EMERGENCY RELEASE handle prior to ejection. Activation of the handle disconnects lapbelt and inertia reel harness, preventing safe ejection.
- When in a spin or other uncontrolled flight, eject at least 10,000 feet AGL whenever possible. Under level flight conditions, eject at least 2000 feet AGL whenever possible. If below 2000 feet AGL, attempt to gain altitude if airspeed permits. Do not delay ejection below 2000 feet AGL for any reason that may commit you to unsafe ejection.
- Wind blast will exert medium force on the body up to 450 knots, severe forces causing flailing and skin injuries between 450-600 knots, and excessive force above 600 knots.

The sequence of events during ejection is shown in figures 1-40 and 1-42. For low level ejection seat performance, refer to figure 1-41. For ejection mode envelopes, refer to figure 3-4. Manual seat separation and manual survival equipment deployment are shown in figure 3-5.

To eject, grasp ejection handle using a two-handed grip with thumb and at least two fingers of each hand. Pull up on handle and continue holding until seat/man separation. The ejection handle will not separate from the seat.

Ejection (Immediate)

1. Ejection handle – Pull.

Ejection (Time Permitting)

If time permits, descend to avoid the hazards of high altitude ejection. Stow all loose equipment and direct the aircraft away from populated areas. Sit with head against headrest, buttocks against back of seat, and feet on rudder pedals.

1. IFF – EMER.
2. **LESS** 46 Secure voice (if installed) (combat status) – ZEROIZE.
3. 46 MASTER ZEROIZE switch (combat status) – ZEROIZE.
4. Visor – Down.
5. Throttle – IDLE.
   Slow to lowest practical airspeed.
6. Assume ejection position.

Ejection Mode Envelopes

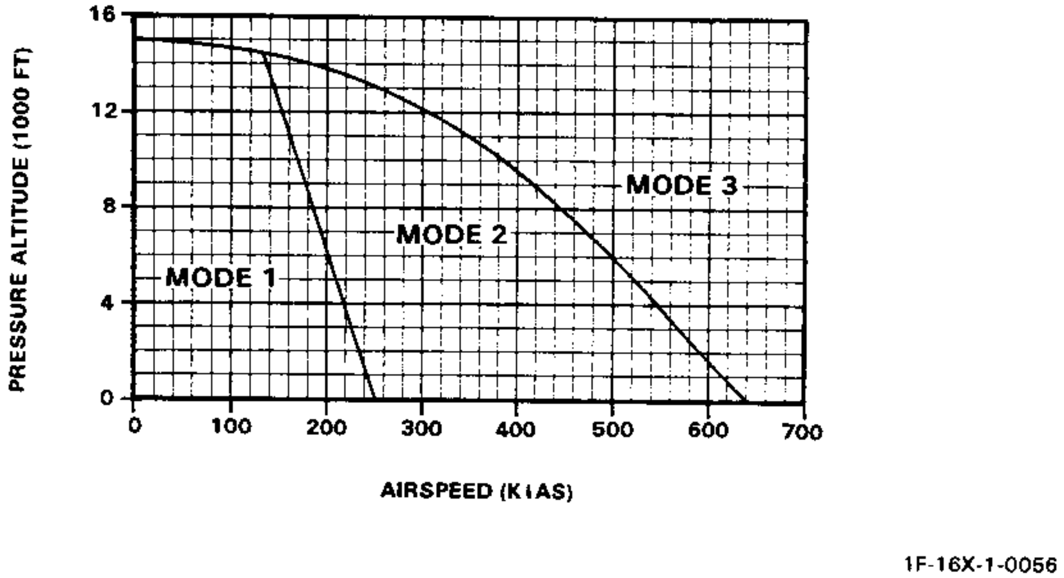


Figure 3-4.

7. Ejection handle – Pull.

Failure of Canopy To Separate

If canopy fails to separate, remain in position for ejection while keeping arms inboard and perform the following:

WARNING

> If canopy is jettisoned or manually released/opened after pulling the ejection handle, the ejection seat will function immediately after canopy separation. Be prepared to immediately put arm back in ejection position when the canopy starts to separate.

1. Canopy – Open normally.
2. Canopy – Jettison.

WARNING

> Pulling the CANOPY JETTISON T-handle other than straight up may cause it to jam.

3. MANUAL CANOPY CONTROL handcrank – Push in and rotate ccw.

WARNING

> Use of the CANOPY JETTISON T-handle or manual canopy control handcrank may result in serious injury. To minimize chances of injury, immediately release the handle as the canopy begins to separate.

Manual Survival Equipment Deployment/Manual Seat Separation

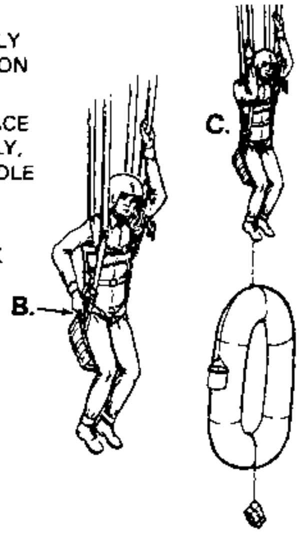
A. IF EMERGENCY OXYGEN FAILS TO RELEASE AUTOMATICALLY UPON EJECTION, PULL THE EMERGENCY OXYGEN ACTIVATION RING LOCATED NEAR THE LEFT HIP.

B. AFTER RECOVERY PARACHUTE DEPLOYMENT, OPEN THE FACE MASK. IF SURVIVAL KIT DOES NOT DEPLOY AUTOMATICALLY, GRASP KIT HANDLE WITH RIGHT HAND AND PULL. KIT HANDLE IS LOCATED NEAR RIGHT HIP.

C. LIFE RAFT INFLATION IS INITIATED BY GRAVITY WHEN THE DROP LINE IS FULLY EXTENDED AFTER KIT OPENING. CHECK RAFT AND IF NOT INFLATED, SNATCH PULL THE LINE TO INFLATE.

NOTE

If the survival kit is deployed after landing in water, a snatch pull on the drop line (near CO_2 bottle) is required to inflate the life raft.

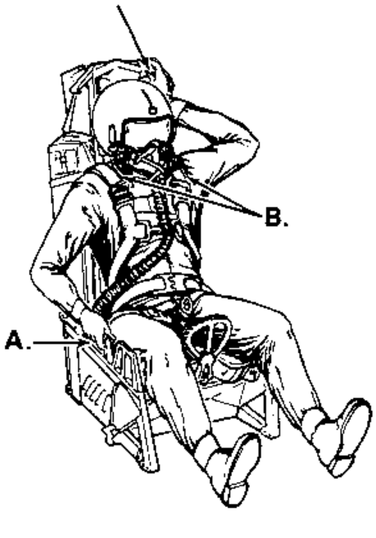


MANUAL SEPARATION

IF BELOW 15,000 FEET (MSL) AND HARNESS RELEASE ACTUATOR FAILS TO OPERATE:

WARNING

After ejection, the RESTRAINT EMERGENCY RELEASE handle should be used if the automatic sequence has failed (modes 1 and 2: refer to figure 3-4). Seat/man separation in modes 1 and 2 should occur rapidly after pulling the ejection handle. If the pilot has time to realize seat separation has not taken place, a failure has probably occurred, and manual release should be initiated. Since manual release may be difficult, it should be considered only as a last resort.



A. PUSH UP ON LEFT PITOT SUPPORT AND SIMULTANEOUSLY PULL THE RESTRAINT EMERGENCY RELEASE HANDLE.

WARNING

- Do not grasp the pitot sensing inlet housing. Severe arm/hand injury could occur while grasping the inlet housings if parachute mortar fires.
- Do not attempt to open the lapbelt. If the lapbelt is opened, the seat will partially fall away, but parachute risers and shoulder harness will remain attached making successful recovery parachute deployment impossible.
- Pulling the RESTRAINT EMERGENCY RELEASE handle bypasses the highly reliable automatic system and should be used only as a last resort. Manual assistance is essential for seat/recovery parachute container separation.

IF RECOVERY PARACHUTE CONTAINER DOES NOT SEPARATE FROM SEAT:

B. JERK ON THE PARACHUTE RISERS, OR USE ANY OTHER METHOD TO FORCE THE RECOVERY PARACHUTE CONTAINER FROM THE SEAT.

WARNING

If the pilot chute with manual assistance does not separate the recovery parachute container from the seat, the pilot will be attached to the seat by the parachute risers.

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Figure 3-5.

Ejection Seat Failure

If the ejection seat fails to function after the ejection handle has been pulled and the canopy has separated from the aircraft, there are no provisions for manual bailout.

DITCHING

Ditch the aircraft only as a last resort. All attempts to eject should be accomplished prior to ditching.

Place the survival KIT DEPLOYMENT switch to manual (M), lock the seat inertia reel, and activate the emergency oxygen system (aircraft oxygen supply hose must be disconnected, using the quick-disconnect, to allow exhalation). Jettison stores. Extend the TEF's using the ALT FLAPS switch. Fly the approach at 13 degrees AOA with the LG up. Attempt to make contact with the water with minimum sink rate and parallel to and on the wave crest. Just before making contact with water, move the throttle to OFF. Immediately after aircraft forward motion stops, disconnect parachute risers, pull RESTRAINT EMERGENCY RELEASE handle, and abandon aircraft. Deploy LPU's and remove and discard oxygen mask. Deploy survival kit as required.

NOTE

- The canopy should have separated during the ejection attempt. If the canopy has been retained, it will provide some protection until forward motion stops but damage to the forward fuselage may lead to entrapment.
- After pulling the RESTRAINT EMERGENCY RELEASE handle, the survival kit may remain in the seat pan. If not, it may hangup when abandoning the aircraft. If any hang up occurs, release the kit using the normal quick-disconnect fittings. Retrieve the survival kit by raising the seat cover and removing the survival kit. Once clear of the aircraft, manually open the survival kit by pulling the kit handle. Locate the CO2 bottle on the life raft and pull the attachment line to inflate the raft.
- If the survival kit deployment switch is left in the automatic (A) position, the survival kit will deploy as the survival kit is removed from the ejection seat.

ELECTRICAL SYSTEM FAILURES

Electrical system failures are indicated by illumination of the ELEC SYS caution light and one or more electrical panel lights (in any combination). After accomplishing the appropriate emergency procedures, refer to EMERGENCY POWER DISTRIBUTION, this section, to determine inoperative equipment for any remaining electrical panel lights.

FLCS PMG Failure (66)

If all four branches of the FLCS PMG fail in flight, the FLCS PMG light will illuminate. The converter/regulator automatically selects the power source with the highest voltage from the available alternate sources. Alternate sources of FLCS power are the main generator, the EPU generator, the EPU PMG, the aircraft battery, and the FLCS batteries.

1. Land as soon as practical.

Main Generator Failure (In Flight)

Main generator failure is indicated by ELEC SYS caution, (66) MAIN GEN, (**LESS** (66) GEN MAIN) EPU run, and EPU AIR lights. Additional lights such as HYDRAZN, EEC, LE FLAPS, and AVIONICS may also illuminate. The EPU will power the EPU generator, and electrical power to the nonessential ac and dc buses will be lost.

1. AOA – 12 degrees maximum (200 knots minimum).

WARNING

LEF's are locked until reset. Exceeding 12 degrees AOA reduces departure resistance. Limit rolling maneuvers to a maximum bank angle change of 90 degrees and avoid rapid roll rates.

2. EPU switch – ON (If run light off).

3. MAIN PWR switch – BATT, then MAIN PWR.
   Verify that switch is returned to MAIN PWR.

If 66 MAIN GEN, **LESS** 66 GEN MAIN light goes off:

4. EPU switch – OFF, then NORM.
5. SERVO ELEC RESET switch – ELEC.
   Resets LEF's and LE FLAPS, CADC, and ADC caution lights (if on).
6. EEC BUC switch – OFF, then EEC.

CAUTION

EEC stall protection may be lost. Do not retard throttle below MIL until subsonic. Set throttle at midrange prior to cycling EEC BUC switch.

7. Land as soon as practical.

If 66 MAIN GEN, **LESS** 66 GEN MAIN light remains on or comes on again:

4. SERVO ELEC RESET switch – ELEC.
   Resets LEF's and LE FLAPS, CADC, and ADC caution lights (if on).
5. EEC BUC switch – OFF, then EEC.

CAUTION

EEC stall protection may be lost. Do not retard throttle below MIL until subsonic. Set throttle at midrange prior to cycling EEC BUC switch.

6. Fuel balance – Monitor.
7. Land as soon as possible.
8. If hydrazine depletes or EPU run light goes off at low thrust – Go to ABNORMAL EPU OPERATION, this section.

After landing and aircraft is stopped:

9. Chocks – Installed (Or parking brake set).
10. EPU switch – OFF.

CAUTION

- If chocks are not installed, be prepared to immediately reengage the parking brake if it disengages when the EPU is shut off.
- **LESS** 72 If the LG is not pinned and the main generator has failed, the LG may retract when the EPU is shut off, the EPU safety pin is installed (with EPU running), or EPU fuel is depleted. This uncommanded retraction can be avoided by pulling the ALT GEAR handle prior to EPU termination. This procedure should only be used when an emergency situation requires immediate ground egress and/or the LG cannot be pinned.

11. MAIN PWR switch – MAIN PWR (Until chocks are installed).

Multiple Generator Failure 66

Failure of both the main and EPU generators will most likely be detected initially by illumination of the MASTER CAUTION, ELEC SYS, and MAIN GEN lights and loss of all avionics (HUD, REO, SCP, and ADI OFF and AUX flags). Other indications may include loss of ECS noise and a gradual loss of cockpit pressurization. The caution lights which would normally illuminate for a failure of just the main generator (e.g., EEC, AVIONICS, LE FLAPS) will not illuminate, since they require essential bus power to operate.

The EPU generator may be inoperative for several reasons, two of which may be remedied from the cockpit. If the EPU AIR light is off, the EPU may not have received an automatic start command; manually turning the EPU on may correct this failure. If the EPU GEN, EPU AIR, and HYDRAZN lights are illuminated but the EPU run light is off, the EPU may be underspeeding. If the EPU PMG light is on or blinking, EPU speed is very slow. The underspeed could be caused by failure of hydrazine to power the EPU in conjunction with a low thrust setting and may be corrected by advancing the throttle. If the EPU generator operates, refer to MAIN GENERATOR FAILURE (IN FLIGHT), this section.

If the EPU generator is still inoperative and the main generator fails to reset and the FLCS PMG light remains off, the primary concern is aircraft battery life for communications, brakes, hook, and **NO** drag chute.

If the FLCS PMG light illuminates when the MAIN GEN and EPU GEN lights are on, there are three possible sources of FLCS power (EPU PMG, aircraft battery, and FLCS batteries). If the EPU PMG, ACFT BATT TO FLCS, and FLCS BATT lights are off, the EPU PMG is supplying power to the FLCS whether the EPU run light is on or off.

If the ACFT BATT TO FLCS and/or FLCS BATT lights are on, the aircraft battery and/or FLCS batteries are supplying power to the FLCS. The ACFT BATT TO FLCS light may come on first. The FLCS BATT lights may come on individually and may be intermittent until FLCS and aircraft battery voltages equalize. The FLCS BATT lights will then remain on steadily. The FLCS batteries and aircraft battery will supply power for FLCS operation for approximately 55 minutes after total generator failure. As the FLCS batteries continue to deplete, the flight controls become increasingly unresponsive and uncommanded maneuvers will occur with gradually increasing severity.

WARNING

Imminent loss of electrical power to the FLCS is indicated by increasingly degraded flight control response and uncommanded motions. Total loss of FLCS power will result in a pitching motion and complete loss of control.

NOTE

70 If total loss of FLCS power occurs in the landing configuration and near final approach airspeed, the pitching motion will be gradual and in the noseup direction for all configurations.

The ACFT BATT FAIL light indicates battery voltage less than 20 volts. Brake operation is doubtful during total generator failure with the ACFT BATT FAIL light on. As aircraft battery voltage continues to decrease, the capability to operate the brakes, lower the hook, and **NO** deploy the drag chute will be lost. Lower the hook early since significantly higher battery voltage is required to lower the hook than is required to keep it fully extended. Once lowered, the hook will remain full down well past the point at which the brakes are lost. An approach-end arrestment is recommended, if conditions permit, because it is difficult to ascertain brake operation. Relative intensity of the warning and caution lights is not a positive indication of battery voltage level.

1. AOA – 12 degrees maximum (200 knots minimum).

WARNING

LEF's are locked and departure susceptibility is increased. Near 1g flight, 200 knots should keep AOA less than 12 degrees. Limit rolling maneuvers to a maximum bank angle change of 90 degrees and avoid rapid roll rates.

2. EPU switch – ON (If run light is off).
3. Climb if necessary.
4. Throttle – 80 percent rpm minimum.

If EPU GEN light goes off:

5. Go to MAIN GENERATOR FAILURE (IN FLIGHT), this section.

If EPU GEN light is still on:

6. MAIN PWR switch – BATT, then MAIN PWR. Verify that switch is returned to MAIN PWR.

If MAIN GEN light goes off:

7. SERVO ELEC RESET switch – ELEC. Resets LEF's and LE FLAPS, CADC, and ADC caution lights (if on).
8. EEC BUC switch – OFF, then EEC.

CAUTION

EEC stall protection may be lost. Do not retard throttle below MIL until subsonic. Set throttle at midrange prior to cycling EEC BUC switch.

9. EPU switch – OFF, then NORM.
10. Land as soon as possible.

If MAIN GEN and EPU GEN lights remain on or come on again:

WARNING

- Plan to land within 30 minutes to insure adequate electrical power for communications, brakes, hook, and NO drag chute.
- If the FLCS PMG light is on in combination with the ACFT BATT TO FLCS or one or more FLCS battery lights, the aircraft battery or FLCS batteries are powering the FLCS. With the aircraft battery powering the FLCS in addition to the battery bus, approximately 55 minutes flight time is available. Communications, brakes, hook, and NO drag chute will not be available after depletion of the aircraft battery.
- When the FLCS is powered by batteries, remain alert for degraded flight controls. At the first indication of degraded response, reduce airspeed and climb to safe ejection altitude. Eject prior to complete loss of control.

7. HOOK switch - DN.
8. Minimize UHF transmissions.

If conditions permit:

9. Land as soon as possible.
   Final approach airspeed is 135 knots plus 4 knots/1000 pounds of stores/ fuel. (Use fuel state when power was lost. This equates to approximately 11 degrees AOA.)
10. LG handle - DN (Use DN LOCK REL button).

WARNING

If LG handle will not lower, select BRAKES CHAN 2 and position ALT FLAPS switch to EXTEND. Nozzle will remain closed resulting in higher than normal landing thrust.

11. ALT GEAR handle - Pull (190 knots maximum).
12. Consider an approach-end arrestment, if conditions permit. (Refer to CABLE ARRESTMENT, this section.)

WARNING

Significantly more brake pedal force than normal may be required to stop. As the aircraft battery depletes, brakes may become inoperative with no cockpit indications. The hook will remain fully extended well past the point at which the brakes are lost. If the HYD/OIL PRESS warning light is on, PTO shaft failure may be indicated. Braking will be available using the brake/JFS accumulators only.

After landing:

13. Stop straight ahead and have chocks installed (or set parking brake).
14. MAIN PWR switch - MAIN PWR (Until chocks are installed).

Multiple Generator Failure LESS 66

Failure of both the main and EPU generators will most likely be detected initially by illumination of the MASTER CAUTION, ELEC SYS, and GEN MAIN lights and loss of all avionics (HUD, REO, SCP, and ADI OFF and AUX flags). Other indications may include loss of ECS noise and a gradual loss of cockpit pressurization. The caution lights which would normally illuminate for a failure of just the main generator (e.g., EEC, AVIONICS, LE FLAPS) will not illuminate since they require essential bus power to operate.

The EPU generator may be inoperative for several reasons, two of which may be remedied from the cockpit. If the EPU AIR light is off, the EPU may not have received an automatic start command; manually turning the EPU on may correct this failure. If the GEN EMER, EPU AIR, and HYDRAZN lights are illuminated but the EPU run light is off, the EPU may be underspeeding. This could be caused by failure of hydrazine to power the EPU in conjunction with a low thrust setting and may be corrected by advancing the throttle. If the EPU generator operates, refer to MAIN GENERATOR FAILURE (IN FLIGHT), this section. If the EPU generator is still inoperative and the main generator

fails to reset, the primary concerns are electrical power for the FLCS and aircraft battery life. If the EPU run and GEN EMER lights are on and the FCS DISC light is off, the EPU PMG is powering the FLCS, and available flight time is not limited by battery life. If the EPU run light is off and the FCS DISC light is on, the FLCS is powered by FLCS batteries and aircraft battery. The FCS DISC light may be on even when the FLCS is also being powered by the aircraft battery. Initially, the FCS DISC light may be intermittent until FLCS batteries and aircraft battery voltages equalize. The FCS DISC light will then remain on steady. The FLCS batteries and aircraft battery will supply power for FLCS operation for approximately 55 minutes after total generator failure. The aircraft battery will deplete first, leaving the FLCS batteries as the only remaining power for the FLCS. As the FLCS batteries continue to deplete, the flight controls become increasingly unresponsive and uncommanded maneuvers will occur with gradually increasing severity.

WARNING

Imminent loss of electrical power to the FLCS is indicated by increasingly degraded flight control response and uncommanded motions. Total loss of FLCS power will result in a pitching motion and complete loss of control.

NOTE

- 70 If total loss of FLCS power occurs in the landing configuration and near final approach airspeed, the pitching motion will be gradual and in the noseup direction for all configurations.
- The EPU PMG power source to the FLCS inverters can temporarily charge the FLCS batteries to a higher than normal voltage level during EPU operation. Following EPU termination or failure after prolonged operation, the FCS DISC light may illuminate steadily.

Equipment powered by the battery bus will remain functional until aircraft battery voltage decreases.

The A/C FAIL light illuminates only for low battery voltage while in flight (approximately 20 volts) regardless of essential dc bus No. 1 power. Other causes for A/C FAIL light illumination function only with WOW.

Wheel brake operation is doubtful with A/C FAIL light illuminated. As aircraft battery voltage continues to decrease, the capability to operate the brakes, lower the hook, and NO deploy the drag chute will be lost. Lower the hook early since significantly higher battery voltage is required to lower the hook than is required to keep it fully extended. Once lowered, the hook will remain full down well past the point at which the brakes are lost. An approach-end arrestment is recommended, if conditions permit, because it is difficult to ascertain brake operation. Relative intensity of the warning and caution lights is not a positive indication of battery voltage level.

1. AOA – 12 degrees maximum (200 knots minimum).

WARNING

LEF's are locked and departure susceptibility is increased. Near 1g flight, 200 knots should keep AOA less than 12 degrees. Limit rolling maneuvers to a maximum bank angle change of 90 degrees and avoid rapid roll rates.

2. EPU switch – ON (If run light is off).
3. Climb if necessary.
4. Throttle – 80 percent rpm minimum.

If GEN EMER light goes off:

5. Go to MAIN GENERATOR FAILURE (IN FLIGHT), this section.

If GEN EMER light is still on:

6. MAIN PWR switch – BATT, then MAIN PWR. Verify that switch is returned to MAIN PWR.

If GEN MAIN light goes off:

7. SERVO ELEC RESET switch – ELEC. Resets LEF's and LE FLAPS, CADC, and ADC caution lights (if on).
8. EEC BUC switch – OFF, then EEC.

CAUTION

EEC stall protection may be lost. Do not retard throttle below MIL until subsonic. Set throttle at midrange prior to cycling EEC BUC switch.

9. EPU switch – OFF, then NORM.
10. Land as soon as possible.

If GEN MAIN and GEN EMER lights remain on or come on again:

WARNING

- If EPU run light is off, aircraft and FLCS batteries are powering the FLCS. Approximately 55 minutes of flight time should be available. Plan to land within 30 minutes to insure adequate electrical power for FLCS, communications, brakes, hook, and NO drag chute.

- When the FLCS is powered by batteries, remain alert for degraded flight controls. At the first indication of degraded response, reduce airspeed and climb to safe ejection altitude. Eject prior to complete loss of control.

7. HOOK switch – DN.
8. Minimize UHF transmissions.

If conditions permit:

9. Land as soon as possible.
   Final approach airspeed is 135 knots plus 4 knots/1000 pounds of stores/fuel. (Use fuel state when power was lost. This equates to approximately 11 degrees AOA.)
10. LG handle – DN (Use DN LOCK REL button).

WARNING

If LG handle will not lower, select BRAKES CHAN 2 and position ALT FLAPS switch to EXTEND. Nozzle will remain closed resulting in higher than normal landing thrust.

11. ALT GEAR handle – Pull (190 knots maximum).
12. Consider an approach-end arrestment, if conditions permit. (Refer to CABLE ARRESTMENT, this section.)

WARNING

Significantly more brake pedal force than normal may be required to stop. As the aircraft battery depletes, brakes may become inoperative with no cockpit indications. The hook will remain fully extended well past the point at which the brakes are lost. If the HYD/OIL PRESS warning light is on, PTO shaft failure may be indicated. Braking will be available using the brake/JFS accumulators only.

After landing:

13. Stop straight ahead and have chocks installed (Or set parking brake).
14. MAIN PWR switch – MAIN PWR (Until chocks are installed).

EPU Malfunctions

UNCOMMANDED EPU OPERATION

Failures can occur which will allow engine bleed air to spin the EPU turbine even though the EPU has not been commanded on. This may not be apparent if the thrust level and amount of bleed air are such that the EPU is turning above or below the speed range which turns on the EPU run light. During uncommanded EPU operation on bleed air, EPU speed varies directly with throttle position. High thrust settings are likely to result in EPU failure.

The EPU may also activate for reasons not apparent to the pilot (momentary main generator loss). Although this is not an EPU malfunction, it will probably be interpreted as uncommanded EPU operation.

If uncommanded operation on bleed air is suspected:

1. Throttle – Minimum practical thrust.

2. Stores – Jettison (If required).
   Only if required to maintain low thrust.

3. Land as soon as possible.

If EPU is running with normal indications:

4. EPU – Leave running.

5. Land as soon as possible.

ABNORMAL EPU OPERATION

Abnormal EPU operation after a normal start command is indicated by one or more of the following: EPU run light flashes, indicating EPU operation in the tertiary speed control mode; EPU run light does not come on or goes off after initial illumination, indicating sustained underspeed or overspeed operation; EPU HYDRAZN light does not go off or EPU fuel quantity continues to deplete when the throttle is advanced to assure adequate bleed air, indicating an EPU bleed air or hydrazine fuel control system problem.

When tertiary speed control is functioning, the EPU run light will alternately cycle on and off (one to three times per second) as a function of EPU speed fluctuating between the normal and slightly above normal speed range. The MASTER CAUTION light may illuminate. (**LESS** 66 The FCS DISC light may also cycle on and off as the sources of FLCS power alternate between the aircraft/FLCS batteries and the emergency generator or its PMG. Adequate FLCS electrical power is available in this mode.) Hydrazine use will occur regardless of available engine bleed air. The hydrazine supply will deplete in approximately 10 minutes. After hydrazine depletion, the EPU will continue to operate with available bleed air on tertiary speed control.

LESS 66 If tertiary speed control cannot control EPU speed (constant EPU overspeed), total EPU failure is imminent. FLCS power is switched to the aircraft battery or the FLCS batteries (whichever has the higher voltage). This prevents excessive voltage generated by the EPU generator or its PMG from causing loss of FLCS electrical power. When the EPU fails, FLCS electrical power will revert to the main generator, if available, or to the aircraft battery or FLCS batteries (FCS DISC light illuminated; ELEC SYS caution light may be reset). The FCS DISC light may be on even when the FLCS is also being powered by the aircraft battery. Initially, the FCS DISC light may be intermittent until FLCS batteries and aircraft battery voltages equalize. The FCS DISC light will then remain on steady.

66 If tertiary speed control cannot control EPU speed (constant overspeed), total EPU failure is imminent. Excessive voltage generated by the EPU generator or its PMG will be regulated by the converter/regulators. When EPU failure occurs, FLCS power will be provided by the FLCS PMG, main generator, aircraft battery, or the FLCS batteries (whichever has the higher voltage).

Under some failure conditions, hydrazine may not be available to the EPU, or it may continue to deplete even with adequate bleed air. If a hydrazine malfunction or depletion occurs, landing will have to be accomplished using an engine thrust setting sufficient to maintain an adequate bleed air supply to the EPU. Failure to maintain minimum engine rpm can result in hydraulic pressure fluctuations or electrical bus cycling. Advance throttle as required to maintain adequate bleed air supply. This may result in a thrust level that is higher than required for a normal straight-in approach. Fully open speedbrakes or a shallower than normal approach may be required. A straight-in approach followed by an approach-end arrestment is recommended.

If EPU was turned on for an 66 ACFT BATT FAIL, **LESS** 66 A/C FAIL light:

1. EPU switch – OFF; then NORM.
   LESS 66 FCS DISC light may come on after turning EPU off. If the light stays on for more than 15 seconds, turn EPU on regardless of status.

If HYDRAZN light is on above 80 percent rpm or if run light is flashing:
   Keep thrust high enough to assure adequate bleed air until descent for landing is required (75-80 percent rpm).

1. EPU fuel quantity – Monitor.

2. Land as soon as possible.

If hydrazine fuel depletes or if run light goes off at low thrust:

1. Throttle – As required.
   Set throttle to keep run light on (75-80 percent rpm).

2. Make an approach-end arrestment, if practical. (Refer to CABLE ARRESTMENT, this section.)

WARNING

If PTO shaft or both hydraulic systems have failed, underspeed of the EPU will result in loss of control. Do not retard throttle completely to IDLE until after touchdown.

CAUTION

If EPU underspeeds, electrical bus cycling may affect brake operation. For a missed engagement, attempt CHAN 1, then CHAN 2 brakes. If no braking is available, consider going around for another engagement or taking a departure-end cable. The parking brake will still operate.

FLCS Battery Discharge 66

FLCS battery discharge is indicated by illumination of one or more FLCS BATT lights. FLCS batteries may supply power to the inverters (discharge) even when other FLCS power sources appear to be operating normally. If more than one FLCS BATT light comes on, the EPU should be started to possibly provide an alternate FLCS power source. If all FLCS BATT lights come on, the EPU must be turned on immediately, regardless of its apparent status. If the FLCS BATT lights do not go off, remaining flight time may depend on the charge state of the FLCS batteries. Inverter output may be monitored by moving the FLCS PWR TEST switch to TEST. A nonilluminated FLCS PWR light indicates that inverter output is bad and that the associated brake in that channel is inoperative. Also the P, R, and Y lights will illuminate when power fails in at least one FLCS branch. The DUAL FC FAIL light will also illuminate if power fails in two or more branches.

WARNING

Imminent loss of electrical power to the FLCS is indicated by increasingly degraded flight control response and uncommanded motions. Total loss of FLCS power will result in a pitching motion and complete loss of control.

NOTE

If total loss of FLCS power occurs in the landing configuration and near final approach airspeed, the pitching motion will be gradual and in the noseup direction for all configurations.

If one FLCS BATT light comes on in flight:

1. Land as soon as practical.
   The FLCS PWR TEST switch should be used to determine which brake(s) may be inoperative. A nonilluminated FLCS PWR light indicates an inoperative brake in the channel indicated.

If more than one FLCS BATT light comes on in flight:

1. EPU switch – On.

If FLCS BATT lights go off:

2. Land as soon as possible.

If FLCS BATT lights remain on:

2. Airspeed – 200-250 knots (6-8 degrees AOA) and climb.
   Climb to the highest practical altitude until descent for landing is required.

3. Land as soon as possible.
   The FLCS PWR TEST switch should be used to determine which brake(s) may be inoperative. A nonilluminated FLCS PWR light indicates an inoperative brake in the channel indicated.

At the first indication of uncommanded or degraded response:

4. Eject.

FLCS Battery Discharge LESS 66

Illumination of the FCS DISC light indicates that one or more of the four FLCS batteries are supplying power to the inverter(s). The FCS DISC light usually illuminates in conjunction with electrical system failures that result in loss of primary and emergency power to the FLCS. However, there are failure modes where FLCS batteries may become the sole source of power regardless of main and EPU generators status.

Because of trickle charge, aircraft may experience a short duration FCS DISC light. The light may be steady or blink rapidly because FLCS battery voltage may occasionally be charged so high that it is within the normal fluctuation range of the inverter dc bus voltage input. The ELEC SYS caution light may or may not illuminate and, if illuminated, may or may not appear resettable.

Illumination of the FCS DISC light requires immediate action because the number of inverters being powered and the charged state of the FLCS batteries cannot be determined. The EPU must be turned on immediately, regardless of its apparent status, to provide an alternate source of power to the inverter(s). If the FCS DISC light cannot be extinguished, remaining flight time may depend on the charged state of the FLCS batteries.

WARNING

Imminent loss of electrical power to the FLCS is indicated by increasingly degraded flight control response and uncommanded motions. Total loss of FLCS power will result in a pitching motion and complete loss of control.

NOTE

If total loss of FLCS power occurs in the landing configuration and near final approach airspeed, the pitching motion will be gradual and in the noseup direction for all configurations.

If a steady or blinking FCS DISC light comes on in flight:

1. EPU switch – ON.

If FCS DISC light goes off:

2. Land as soon as possible.

If FCS DISC light remains on:

2. Airspeed – 200-250 knots (6-8 degrees AOA) and climb.
   Climb to the highest practical altitude until descent for landing is required.

3. Land as soon as possible.

At the first indication of uncommanded or degraded response:

4. Eject.

Partial Electrical Power Loss

Loss of power to several systems or indicators without any indications on the electrical panel may be due to loss of one or more ac or dc buses. Refer to EMERGENCY POWER DISTRIBUTION, this section, to determine the affected equipment and electrical buses. Loss of power to essential and nonessential ac and dc No. 1 buses or (46) the nacelle ac buses may be the result of a tripped overload protection unit.

The overload protection unit(s) may be reset by depressing the ELEC CAUTION RESET button on the electrical panel. If the unit trips again, the ELEC CAUTION RESET button may be depressed again although it may not reset the bus if the fault persists.

1. ELEC CAUTION RESET button – Depress.
   May reset overload protection unit(s).

If power is not restored:

2. EPU switch – ON.

3. Land as soon as possible.

4. Refer to EMERGENCY POWER DISTRIBUTION, this section.

Aircraft Battery Failure

Aircraft battery system failure will be indicated by the ELEC SYS and (66) ACFT BATT FAIL, **LESS** (66) A/C FAIL lights. The ELEC SYS caution light may not be resettable. If the battery has failed and the main generator subsequently fails, only the rotating main generator PMG may be available to manually activate the EPU. Turn the EPU on immediately after battery failure is indicated.

The (66) ACFT BATT FAIL light, or **LESS** (66) A/C FAIL light illuminates only for low battery voltage while in flight (approximately 20 volts). Other malfunctions illuminate the light only with WOW. If a battery overheat or a battery cell imbalance occurs in flight and is still present after landing, the (66) ACFT BATT FAIL light, or **LESS** (66) A/C FAIL light will illuminate 60 seconds after WOW.

CAUTION

If the aircraft battery has failed (and EPU is off), do not taxi except to clear runway. Subsequent loss of the main generator will result in loss of all braking, NWS, hook, radios, and **NO** drag chute.

1. EPU switch – ON.

2. Land as soon as possible.

If EPU runs abnormally:

3. EPU switch – OFF, then NORM.
   If main generator subsequently fails and aircraft battery power is not available, EPU turn-on power may not be available. **LESS 66** FCS DISC light may come on after turning EPU off. If the light stays on for more than 15 seconds, turn EPU on regardless of status.

4. Land as soon as possible.

Emergency Power Distribution

Refer to figure 3-6.

Emergency Power Distribution

MAIN GENERATOR FAILED/EPU GENERATOR OPERATING

SYSTEM	INOPERATIVE EQUIPMENT	BUS ASSIGNMENT			
		NONESS AC		NONESS DC	
		NO. 1	NO. 2	NO. 1	NO. 2
ENGINE	MAX POWER Switch			X*	
FUEL	Boost and Transfer Pumps		X		
	ENG FEED Knob			X*	
	FUEL HOT Caution Light			X*	
	Tank Inerting			X***	
NAV/COMM	IFF (Mode 4)		X		
	IFF			X***	
STORES MANAGMT	Normal Armed Release (AGM-65 A,B)		X		
AVIONICS	ECM			X***	
	FCC	X			
	FCR	X		X*	
	REO	X			
	TISL		X	X	
	TWS		X		
LIGHTS	FLOOD CONSOLES		X		
	FLOOD INST PNL		X		
	FORM		X		
	Malfunction & Indicator Light Test/DIM Feature			X***	
	TAXI		X		
OTHER	Chaff Dispenser			X*	
	Seat Adjust		X		
	TT Probe Heater	X			

* 46 Nacelle Bus *** LESS 46

Figure 3-6. (Sheet 1)

Emergency Power Distribution

MAIN AND EPU GENERATORS FAILED

(All equipment from sheet 1 plus the following:)

SYSTEM	INOPERATIVE EQUIPMENT	BUS ASSIGNMENT			
		ESS AC		ESS DC	
		NO. 1	NO. 2	NO. 1	NO. 2
ENGINE	ANTI-ICE Switch			X	
	EEC Caution Light (EEC Faults)			X	
	Fire/Overheat Detect and Test		X		
	HYD Pressure Indicators		X		
	Nozzle Position Indicator		X		
	Oil Pressure Indicator		X		
FLIGHT INSTRUMENTS	Altimeter (ELECT)	X			
	ADI		X		
	AOA Indexer			X	
	AOA Indicator	X			
	HSI		X		
FUEL	Automatic Forward Fuel Transfer				X
	External Fuel Transfer				X
	Fuel Flow Indicator	X			
	FUEL LOW Caution Lights				X
	Fuel Quantity Indicator		X		
	Tank Inerting				X*
FLIGHT CONTROLS	Autopilot			X	X
	FLCP (All Lights, Reset/Arm and Self-Test Capability)			X	
	LEF's	X			
	LE FLAPS & ADC Caution Lights				X
	Speedbrakes			X	
	Stick Trim				X
NAV/COMM	FCNP			X	
	IFF			X*	
	ILS				X
	INS	X			
	Secure Voice				X
	TACAN		X	X	
	VHF			X	

* 46

Figure 3-6. (Sheet 2)

Emergency Power Distribution

MAIN AND EPU GENERATORS FAILED - CONT

(All equipment from sheets 1 and 2 plus the following:)

SYSTEM	INOPERATIVE EQUIPMENT	BUS ASSIGNMENT			
		ESS AC		ESS DC	
		NO. 1	NO. 2	NO. 1	NO. 2
STORES MANAGMT	AIM-9 Audio & Gyro		X		
	ALT REL Button			X	
	**CIU			X	X
	Gun		X		X
	**MASTER ARM Switch			X	X
	MSL STEP Switch			X	
	Normal Armed Release, Stations 1,4,5,7&8			X	
	Normal Armed Release, Stations 2,3,6&9				X
	NUCLEAR CONSENT Switch			X	
	SCP (Left Half)			X	
	SCP (Right Half)				X
	STORES CONFIG Caution Light				X
	**Stores Jettison (SEL and EMER)			X	X
	A BF WPN REL Button				X
	BR WPN REL Button			X	
AVIONICS	CADC	X			
	CADC Caution Light			X	
	ECA	X			X
	TWS				X
	ECM				X*
LIGHTS	ANTICOLLISION		X		
	AR (Flood)		X		
	DE NO A Ident				X
	PRIMARY CONSOLES	X			
	PRIMARY INST PNL	X			
	LANDING		X		
	LANDING/TAXI/External Switches				X
	MAL & IND LTS TEST/BRT DIM Feature				X*
	NAV/FREQ DISP	X			
	POSITION		X		

* 46 ** Indicates redundancy

Figure 3-6. (Sheet 3)

Emergency Power Distribution

MAIN AND EPU GENERATORS FAILED - CONT

(All equipment from sheets 1, 2, and 3 plus the following:)

SYSTEM	INOPERATIVE EQUIPMENT	BUS ASSIGNMENT			
		ESS AC		ESS DC	
		NO. 1	NO. 2	NO. 1	NO. 2
LG/NWS/ BRAKES	LESS 48 One Brake Hydraulic Circuit (Half-Brakes)				X
	LG Door Close				X
	LG Down Permission Button			X	
	LG Hydraulic Isolation				X
	LG UP-DN Command				X
	NWS			X	
	WHEELS Down Lights			X	
OTHER	Air Data Probe Heaters (Nose & Fuselage)	X			
	**Air Source Knob			X	X
	AOA Probe Heaters	X			
	AR System			X	
	Cockpit Temperature Control			X	
	AVTR				X
	Battery Charge Power			X	
	CAMERA/GUN Trigger				X
	ECS				X
	EQUIP HOT Caution Light				X
	HUD				X
	HUD/CTVS	X			
	OXY LOW Caution Light				X
	Oxygen Quantity Indicator		X		
	PROBE HEAT Switch			X	
	SEAT NOT ARMED Caution Light				X

** Indicates redundancy

Figure 3-6. (Sheet 4)

Emergency Power Distribution

OPERATING EQUIPMENT - MULTIPLE GENERATOR FAILURE

SYSTEM	OPERATING EQUIPMENT
ENGINE	Anti-Ice BUC EEC (No Supersonic Stall Protection) UFC
INSTRUMENTS	Airspeed/Mach Indicator Altimeter (PNEU) FTIT Indicator LESS 46 LEF's Position Indicator RPM Indicator SAI Vertical Velocity Indicator
FUEL	FUEL MASTER Switch FFP
FLIGHT CONTROLS	Functional (Except LEF's, Speedbrakes, Autopilot, and Stick Trim)
NAV/COMM	Intercom Magnetic Compass UHF
LIGHTS	Spotlights Utility Light
LG/NWS/ BRAKES	Alternate LG Extension 48 Normal Brakes LESS 48 One Brake Hydraulic Circuit (Half-Brakes) Parking Brake
WARNING LIGHTS	CANOPY DUAL FC FAIL 57 ENGINE HYD/OIL PRESS LG Warning (Handle) T.O./LAND CONFIG

Figure 3-6. (Sheet 5)

Emergency Power Distribution

OPERATING EQUIPMENT - MULTIPLE GENERATOR FAILURE - CONT

SYSTEM	OPERATING EQUIPMENT
CAUTION LIGHTS	ANTI SKID BUC EEC (Function of EEC BUC Switch Position Only - Will Not Indicate EEC Faults) ELEC SYS FLT CONT SYS HOOK MASTER CAUTION
OTHER	Canopy Activation (on Battery Box Bus) NO Drag Chute EPU HOOK JFS MAIN PWR Switch 57 VWCS

Figure 3-6. (Sheet 6)

ENGINE MALFUNCTIONS

Engine Fire

Engine fires which occur in the engine bay will generally first be indicated by the ENG FIRE warning light. FTIT may or may not be higher than normal. Explosions, vibrations, or engine instrument fluctuations are usually indicative of a serious engine problem; engine failure may be imminent. Immediate action should be taken to reduce thrust to the minimum practical level while attaining safe ejection parameters.

Fires can also occur in the nozzle area when using AB. These fires are the result of portions of the nozzle failing which allows the AB plume to burn through the nozzle. Since these fires are aft of any detection circuits, the ENG FIRE warning light and FTIT gage will not indicate a problem. Additionally, the nozzle will indicate normally, and there will be no vibrations or instrument fluctuations.

In most cases, these AB-related nozzle fires are detected by someone outside the aircraft (wingman, tower, etc.). When operating in AB and a fire is reported at the rear of the aircraft, deselect AB immediately. This action should extinguish a nozzle fire and minimize damage to the aircraft skin, speedbrakes, nozzle, and possibly the flight controls; however, nozzle damage may result in a noticeable thrust loss. In this case, refer to ABNORMAL ENGINE RESPONSE/THRUST LOSS, this section.

With any engine fire, the first response should be to retard the throttle as far as practical. Sufficient time should exist to establish favorable ejection parameters while analyzing the situation. Time for an AB-related nozzle fire to extinguish is variable; however, ventilation should inhibit forward movement of the fire into and through the engine bay. The ejection decision should be based on cockpit indications that the fire has progressed into the engine bay, degraded flight controls, or insufficient thrust. Ejection is considered preferable to landing with an engine fire that will not extinguish.

If on takeoff and conditions permit:

- Abort.

If takeoff is continued:

Climb.
Maintain takeoff thrust until minimum recommended ejection altitude is attained and then throttle to minimum practical.

Stores – Jettison (If required).

At a safe altitude:

3. Throttle – Minimum practical.
If fire occurred in AB, ENG FIRE light may not come on. Fire should extinguish after throttle is retarded; however, nozzle damage may result in lower than normal thrust.

If fire persists:

4. Eject.

OVERHEAT Caution Light

Detection of an overheat condition in the engine compartment, ECS bay, wheel well, or EPU bay will illuminate the OVERHEAT caution light.

1. Throttle – Minimum practical.

2. ENG FIRE light – Test and monitor.

If OVERHEAT caution light remains on and EPU is running:

3. EPU switch – OFF (If feasible).
If the EPU was manually turned on, consider turning it off to determine if it is the source of the overheat condition. If the OVERHEAT caution light does not go off, the EPU should be turned back on.

WARNING

If the EPU was activated for 66 FLCS BATT or LESS 66 FCS DISC light(s), be prepared to reactivate the EPU if the battery discharge light(s) reilluminates and remains on for longer than 15 seconds.

If the OVERHEAT caution light remains on:

4. OXYGEN – 100%.

5. AIR SOURCE knob – OFF.
External fuel cannot be transferred in OFF or RAM. Consider jettisoning tanks to decrease drag if range is critical and the ECS cannot be turned on for short periods to transfer fuel.

6. Descend to below 25,000 feet and reduce airspeed to below 500 knots.

When airspeed is reduced and cockpit is depressurized:

7. AIR SOURCE knob – RAM (Below 25,000 feet).
External fuel cannot be transferred in RAM or OFF. Consider jettisoning tanks to decrease drag if range is critical and the ECS cannot be turned on for short periods to transfer fuel.

8. Nonessential electrical equipment – Off.

NOTE

If in VMC and the ADI and HSI are not required for flight, the INS should be considered nonessential.

If OVERHEAT caution light still remains on:

9. LG handle – DN (300 knots maximum).

10. Land as soon as possible.

Oil Pressure Malfunction

An oil system malfunction is characterized by a pressure (including fluctuations) below 15 psi at IDLE or 30 psi at MIL, above 70 psi at any thrust setting, pressure fluctuations greater than ±5 psi at IDLE or ±10 psi above IDLE, or by a lack of oil

pressure rise when the throttle is advanced. The oil pressure gage can be used as an early indicator of oil loss. An indication of excessive oil loss is the lack of oil pressure rise when the throttle is advanced in IDLE to MIL range. These conditions may not occur until approximately one-half the usable oil is lost. The HYD/OIL PRESS warning light may not come on until most of the usable oil is lost. At the first indications of an oil system malfunction, take immediate action to land as soon as possible.

Climbing to a higher altitude allows a higher cruise and increases glide range. However, if the oil malfunction is caused by an internal engine oil leak, the rate of oil loss is decreased at low altitudes and throttle settings. Usually it is advisable to climb to a reasonable cruise altitude. Once at altitude, reduce throttle to approximately 80 percent rpm and do not move the throttle unless absolutely required. With zero oil pressure, any throttle movement may cause the engine to seize. Minimize maneuvering g to minimize loads. Plan an approach which will allow a flameout landing from any position should engine seize. Refer to SIMULATED FLAMEOUT LANDING, this section.

If an oil pressure malfunction is suspected:

1. Attain desired cruise altitude.
   The rate of oil loss is decreased at low altitudes and low throttle setting.

2. Stores – Jettison (If required).

3. Engine rpm – Approximately 80 percent.

4. Throttle – Do not move until landing is assured.

CAUTION

Throttle movement/rpm change may cause engine seizure.

5. Land as soon as possible.
   Plan to fly an SFO (refer to FLAMEOUT/SFO LANDING, this section).

EEC Caution Light

The EEC caution light will come on in response to an EEC failure, electrical power interruption, an EEC input failure, or detection of an engine overspeed condition. Positioning the EEC BUC switch to OFF or BUC will also turn the EEC caution light on. If the EEC caution light is on as a result of an engin overspeed, the EEC is automatically turned off and cannot be reset.

If the CADC caution light is also illuminated, t[illegible] EEC is not receiving valid mach data. In this ca[illegible] all EEC functions are working properly except supersonic stall protection. Leave the EEC BUC switch in EEC and avoid supersonic flight. If the throttle is retarded below MIL at supersonic speed the engine may stall or stagnate. If the CAD[illegible] caution light comes on while supersonic, retard the throttle to MIL and use speedbrakes as required to decelerate to subsonic. When subsonic, set the throttle approximately halfway between MIL and IDLE (midrange). This normally corresponds to 80-85 percent. With the throttle at midrange, attempt t[illegible] reset the EEC and clear the light by cycling the EE[illegible] BUC switch from EEC to OFF and back to EEC. If the light remains on, return the EEC BUC switch to OFF and land as soon as practical. With the EEC off or inoperative, engine stall protection features a[illegible] MIL and IDLE are lost. Avoid rapid throttle movements. Do not exceed 88 percent rpm or use AB unless required to maintain flight. Do not allow rpm to decrease below 80 percent above 15,000 feet or [illegible] percent below 15,000 feet to avoid a stall or stag[illegible] tion particularly if the throttle is advanced. During landing with the EEC off, IDLE thrust will be higher than normal because the nozzle will be closed rather than open. If stopping distance is critical, the EEC BUC switch can be returned to EEC after landing in an attempt to open the nozzle and decrease thrust.

If the EEC caution light illuminates or an EEC malfunction is suspected:

If supersonic:

1. Throttle – Retard to MIL.

CAUTION

Retarding the throttle below MIL while supersonic may stall the engine.

When subsonic:

2. Throttle – Midrange.
   80-85 percent rpm.

If engine rpm is erroneously zero:

3. Go to ZERO RPM, this section.

If CADC and EEC caution lights are on:

4. SERVO ELEC RESET switch – ELEC.
   CADC caution light must reset before EEC caution light will reset.

5. EEC BUC switch – OFF, then EEC.

If CADC and EEC caution lights reset:

6. Continue normal operation.

If CADC and EEC caution lights remain on:

6. Remain subsonic (flight may be continued).
   All EEC functions are working properly except for supersonic stall protection.

If only EEC caution light is on:

4. EEC BUC switch –OFF, then EEC.

If EEC caution light resets:

5. Continue normal operation.

If EEC caution light remains on:

5. EEC BUC switch – OFF.

6. Throttle – As required.

CAUTION

With EEC off, stall protection at IDLE and MIL is lost. Maintain 80-88 percent rpm above 15,000 feet and 70-88 percent rpm below 15,000 feet until landing is assured.

7. Land as soon as practical.
   During landing with EEC off, idle thrust will be higher than normal.

After landing, if stopping distance is critical:

8. EEC BUC switch – EEC.

Prior to shutdown:

9. EEC BUC switch – EEC.
   Record nozzle and rpm response.

FTIT Indicator Failure

Certain failures of the engine history recorder can cause the FTIT indicator to erroneously indicate 1200°C. If the rpm indicator responds normally to throttle movement, the engine has not stagnated and should not be shut down. Routine missions should not be continued since FTIT cannot be monitored.

Zero RPM

An rpm indicator which fails to zero indication while other engine instruments indicate normal engine operation must be interpreted as a failure of the engine alternator rather than a gage failure. With an engine alternator failure, the EEC will be inoperative (but the EEC caution light may not illuminate). Normal engine protection functions are lost. There will be no engine or AB ignition. The AB may light due to a hot streak from the engine; however, the AB should be selected only if required to maintain flight. Hot streak ignition of the AB may result in a stall or stagnation. If the engine is shut down, there may be no way to restart it.

1. Throttle – Midrange.
   Maintain 700°-750°C FTIT until landing is assured. EEC may be inoperative with no EEC caution light on.

WARNING

Assume engine alternator is inoperative. If the engine stalls or stagnates and is shut down, an airstart may not be possible.

2. Land as soon as practical.

Abnormal Engine Response/Thrust Loss

Abnormal engine response in the IDLE to MIL range is varied and generally indicated by abnormal thrust in relation to throttle position, engine oscillations, a complete lack of engine response to throttle movement, or insufficient thrust. A UFC and/or an EEC malfunction can cause engine oscillations, improper engine response, complete lack of engine response to throttle commands, or overtemperature/overspeed indications.

Oscillations which occur at IDLE or MIL are generally EEC associated. Oscillations which occur between IDLE and MIL are generally UFC associated.

Placing the throttle at midrange and turning off the EEC will eliminate EEC generated problems, while moving the throttle will often cure UFC generated problems. Problems not eliminated by turning off the EEC can often be overcome by selecting BUC.

Insufficient thrust can be caused by problems in the UFC. Characteristic engine parameters at MIL with EEC on may be nearly normal rpm, lower than normal FTIT, and nozzle position greater than 30 percent. Turning the EEC off will close nozzle to less than 30 percent at MIL or below; however, thrust will still be insufficient. Lack of engine response to throttle commands can also be caused by problems in the UFC. Generally, no caution light will illuminate. If the throttle is retarded to OFF, it may not be possible to airstart in UFC; therefore, do not diagnose thrust loss and/or lack of throttle response as stagnation. Because the BUC bypasses the UFC and many of its inputs, it should be used when serious engine problems occur. In addition, insufficient thrust can also be caused by a failed open nozzle. A failed closed nozzle will result in normal engine thrust below AB and stalls when AB is attempted. If the rpm, FTIT, and nozzle appear normal for the thrust available and the engine fails to respond to throttle commands, the throttle linkage may have failed. If throttle is stuck or otherwise prevented from normal movement, rotate throttle with cutoff release depressed and use necessary force to move throttle as required.

The engine may roll back, which will prevent the engine from reaching normal rpm and FTIT levels when the throttle is advanced. This rollback is generally caused by the EEC sensing an out-of-limits condition and may not be accompanied by an EEC caution light. For this situation or any abnormal engine response below AB, follow the procedures of this section until the situation is corrected.

In general, if abnormal engine response or a loss of thrust is experienced, the throttle should be set at midrange and the EEC switch placed to OFF to determine if the EEC has caused the problem. If necessary, the EEC can be turned off regardless of throttle setting. If satisfactory engine response is attainable in UFC, keep the EEC BUC switch in OFF and land as soon as practical. If thrust is insufficient at 88 percent rpm, advance throttle to MIL.

If thrust is still insufficient, response depends on whether the nozzle has failed open or a UFC problem has occurred. If possible, visually confirm nozzle position because there is a possibility of a failure of the nozzle indication system, although the chances of the indicator being in error are remote. In the absence of visual confirmation of nozzle position, procedural actions must be based on indicated position. A failed open nozzle is indicated by nozzle position greater than 30 percent with the EEC off and throttle at MIL. Attempt to light the AB by snapping throttle to mid-AB. Several attempts to obtain a successful AB light should be made. After AB light, throttle movement in AB is allowed. Transfer to BUC only if AB fails to light. Transferring to BUC with a failed open nozzle will result in a decrease in engine thrust. If nozzle is greater than 30 percent while in BUC, maintain minimum required throttle setting to minimize the possibility of engine damage.

A UFC malfunction is indicated by insufficient thrust in AB or abnormal engine response with normal nozzle (less than 30 percent) and EEC off. If this occurs, transfer to BUC. If transfer does not occur (BUC caution light remains off), advance throttle until transfer occurs.

1. Throttle – Midrange.
   80-85 percent rpm, time and altitude permitting.

2. EEC BUC switch – OFF.
   The EEC can be turned off regardless of throttle setting.

CAUTION

> With EEC off, stall protection at IDLE and MIL is lost. Maintain 80-88 percent rpm above 15,000 feet and 70-88 percent rpm below 15,000 feet until landing is assured.

If thrust is insufficient at 88 percent rpm:

3. Throttle – MIL.

4. Stores – Jettison (If required).

If thrust is still insufficient or if serious engine problem persists and nozzle is open (more than 30 percent):

5. Throttle – Snap to mid-AB.
   Several attempts should be made to obtain a successful AB light. After light-off, throttle movement in AB is allowed.

6. If required, go to THRUST TOO HIGH FOR LANDING, this section.

If problem persists:

7. Throttle – Midrange.
   80-85 percent rpm.

8. EEC BUC switch – BUC.
   If transfer does not occur, advance throttle until BUC light comes on.

CAUTION

Use minimum throttle setting with nozzle open.

9. Throttle – As required.

CAUTION

- Refer to Section V for BUC operating limits.
- Maintain rpm 80 percent minimum above 15,000 feet and 70 percent minimum below 15,000 feet until landing is assured.
- Avoid rapid throttle movements.
- Use 5 seconds minimum during BUC IDLE to MIL acceleration.
- AB operation is prohibited in BUC.

10. Land as soon as possible.

If thrust is still insufficient or if serious engine problem persists and nozzle is closed (less than 30 percent):

5. Throttle – Midrange.
   80-85 percent rpm.

6. EEC BUC switch – BUC.

   If transfer does not occur, advance throttle until BUC light comes on.

7. Throttle – As required.

CAUTION

- Refer to Section V for BUC operating limits.
- Maintain rpm 80 percent minimum above 15,000 feet and 70 percent minimum below 15,000 feet until landing is assured.
- Avoid rapid throttle movements.
- Use 5 seconds minimum during BUC IDLE to MIL acceleration.
- AB operation is prohibited in BUC.

8. Land as soon as possible.

AB Blowout/Failure To Light

If AB fails to light, the nozzle may open 30-50 percent and then close. Retard throttle to MIL. Refer to AFTERBURNER OPERATION AND LIGHT-OFF LIMITS, Section V, for AB limitations before further AB use is attempted. Wait 1.5 seconds minimum before reinitiating AB.

Thrust Too High for Landing

If thrust is too high to permit safe landing after following procedures outlined in ABNORMAL ENGINE RESPONSE (NON-AB), this section, or if engine is stuck in AB, an uncorrectable problem with the throttle linkage or the engine control system has occurred. Use excess thrust to climb and head for nearest suitable airfield. Once high key for a flameout landing is assured, follow procedures as outlined in FLAMEOUT/SFO LANDING, this section. Shut down the engine by placing throttle to OFF or, if necessary, by placing the FUEL MASTER switch to OFF. **LESS 73** The main fuel shutoff valve is safety-wired open and the FUEL MASTER switch is deactivated.

1. Plan a flameout landing.

When landing is assured:

2. Throttle – IDLE.

If thrust is still too high:

3. JFS switch – START 2.
   Below 20,000 feet and below 400 knots.

4. EPU switch - ON.

5. Throttle - OFF.

If throttle is stuck or engine does not respond, shut down engine with the FUEL MASTER switch. At MIL, the engine will flameout in approximately 6 seconds.

NOTE

LESS 73 The main fuel shutoff valve is safety-wired open and the FUEL MASTER switch is deactivated. The engine will continue to run until fuel starvation.

6. Refer to FLAMEOUT/SFO LANDING, this section.

ENGINE STALLS

During an engine stall, the airflow reverses in the fan or compressor for less than 1 second and then reaccelerates normally through the engine. The engine may continue this cycle until it self-recovers or stagnates. The number of times an engine stalls before it stagnates may vary from one to several stall cycles. The two primary causes of a stall are insufficient airflow and hardware problems. Airflow problems may occur during operation at too high an altitude and/or too low an airspeed. Refer to figure 5-3. The hardware associated stalls may result from a failed nozzle, an EEC/UFC malfunction, or improper engine trim.

The first indication of a stall at high thrust settings may be a loud bang or pop. At lower thrust settings, the first indication may be loss of thrust, lack of throttle response, or decreasing rpm. Throttle reduction is appropriate as a first response to clear any stall. Engine stalls can be divided into two types, AB stalls and non-AB stalls.

AB Engine Stalls

Types of AB stalls are:

- AB initiation - Stall at AB light-off.
- AB sequencing - Stall during AB sequencing, either as the AB stages light with the throttle in MAX AB or as the throttle is moved in the AB range.
- AB cancellation - Stall during throttle retard from AB.
- AB blowout/relight - Stall occurs during relight after a blowout in stabilized AB. May be preceded by AB rumble.

AB stalls are normally accompanied by a loud bang or pop and a series of fireballs from the engine exhaust and occasionally the engine inlet. This is followed by an erratic flame from the engine exhaust if the engine stagnates. These characteristics could be mistaken for an aircraft fire. Whenever a stall occurs while operating in AB, the throttle should be snapped out of AB to MIL. At the MIL position, stall recovery logic is most effective and provides the best protection from engine stagnation. This will usually clear the stall and restore normal operation. The stalls may continue at MIL and are characterized by bangs or pops of lower intensity than AB stalls.

FTIT fluctuations and decreasing rpm will probably accompany these stalls. The throttle should be retarded to IDLE if the stall continues for a few seconds. The engine may continue to stall at idle but may not be audible, particularly at high altitudes. The engine instruments should be monitored for indications of a stall. FTIT may continue to rise while rpm decreases. If the stall continues at idle, a stagnation may result.

Depending upon flight conditions, AB stalls may be expected. Refer to figure 5-3. Stalls should not occur in region 1. If a stall occurs in region 1, the engine is safe to operate for the rest of the flight in the IDLE to MIL range provided no other abnormal engine indications are observed. Stalls may occur during throttle transients in region 2. In region 3, stalls may occur during steady state AB operation (AB blowout/relight). If a stall occurs in region 2 or 3, no FTIT limits were exceeded, and if the AB operates normally in region 1, the flight may be continued and the AB may be used. If the engine stalls at a low altitude, an immediate climb should be initiated. Retarding the throttle to MIL may clear the stall and allow the engine to be readvanced. At low altitude, time may not be available to recover the engine if it stagnates. If engine response at low altitude is not sufficient to maintain or gain altitude and a suitable field is not immediately available, ejection may be required.

Non-AB Engine Stalls

Non-AB stalls may occur if the UFC or EEC is malfunctioning, particularly during throttle transients near idle. Non-AB stalls, although not frequent, are often a symptom of a serious engine

problem. Non-AB stalls may be inaudible; the first indication may be a lack of throttle response. The throttle should be immediately retarded to IDLE. If engine recovers, EEC off restrictions on throttle movements should be observed until landing is assured.

Engine Stagnation

Stagnations are usually characterized by rising FTIT and decreasing rpm or rpm less than 60 percent and a lack of rpm response to throttle commands or 57 the ENGINE warning light will illuminate. FTIT can either spike, steadily increase, or even decrease immediately following a high thrust stagnation. During low thrust stagnation, FTIT can stabilize in the engine normal operating range of less than 970°C. Since FTIT can be deceptive, low rpm (less than 60 percent) is generally the best indication. Audible indications may not be present if the stall occurred at low thrust. Once a stagnation has occurred, there is no way to recover normal engine operation except to shut down the engine and restart it. Allowing a stagnated engine to run will result in decreasing rpm, increasing FTIT, a loss of thrust, loss of altitude, and engine damage. As soon as stagnation is confirmed, immediately move the throttle to OFF. There is every reason to expect a normal airstart and normal engine operation if the engine is shut down to clear a stagnation, especially if the engine was shut down without allowing FTIT to remain at high temperatures for an extended period. Refer to figure FO-14.

Engine Stall Recovery

If an AB stall occurs:

1. Throttle – Snap to MIL.

If an AB stall does not clear or stall occurs below AB:

NOTE

Non-AB stalls may be inaudible.

2. Throttle – IDLE.

If stall clears:

3. Throttle – Midrange.
   80-85 percent rpm.

4. EEC BUC switch – OFF, then EEC.

NOTE

Cycling EEC BUC switch resets EEC logic to prevent an overspeed.

If stall occurred at MIL or below:

5. Land as soon as possible.
   Observe EEC off operating limits.

If stall occurred in AB:

5. Throttle – As required.
   If stall occurred in:
   - Region 1, do not use AB unless needed.
   - Region 2 or 3, no FTIT limits were exceeded, and AB operates normally in region 1, continue flight.

If stall progresses to a stagnation:
RPM less than 60 percent with no rpm response to throttle movement is a positive indication of a stagnation.

3. Throttle – OFF.

WARNING

Shutting down the engine with an engine alternator failure (indicated by zero rpm and normal thrust) will result in no ignition for an airstart.

4. Initiate airstart. (Refer to AIRSTART UFC/BUC, this section.)

Flameout

The engine should not flameout with the throttle above IDLE since ignition is continuous above 15 percent rpm. If the engine flames out, it has been denied fuel or a mechanical failure has occurred.

Fuel starvation can occur due to a lack of fuel in the reservoir tanks, prolonged negative-g flight, or a failure in the fuel feed system. If the reservoir tanks do not contain fuel, an airstart is impossible. If fuel starvation was due to a temporary lack of fuel, restart should be possible. If fuel flow is abnormally high or fuel tank depletion is abnormally rapid for the throttle position, a fuel leak may exist. Action should be taken to land as soon as possible. If range or altitude is a consideration, a climb should be

initiated. Throttle should be retarded to minimize fuel loss. If fuel quantities appear normal, the UFC may have malfunctioned. This may be due to fuel contamination. In this case, shutting down the engine may clear the contaminated fuel and allow a UFC start. Certain UFC problems may necessitate a BUC start.

Main fuel pump failure or tower shaft geartrain failure will also cause flameout. Both present similar symptoms: an abrupt decrease of indicated fuel flow to less than 500 pph, loss of main generator, EPU activation, no throttle response, and illumination of the BUC caution light even though the EEC BUC switch is in EEC or OFF. If only the main fuel pump has failed, the cockpit rpm indication will reflect a gradual spooldown. The JFS can be started and the engine can be motored at approximately 25 percent rpm. If the BUC caution light remains on (with the EEC BUC switch still in EEC or OFF and rpm above 15 percent), the engine probably cannot be restarted; therefore, place primary emphasis on a flameout landing while continuing airstart attempts. If unable to make a flameout landing, refer to EJECTION (TIME PERMITTING), this section. Failure of the engine tower shaft or its associated geartrain will result in loss of all power to the engine gearbox and the ADG. The initial symptoms are similar to failure of the main fuel pump since the main fuel pump is driven through the tower shaft system. The primary difference is that the cockpit rpm indicator drops immediately to zero since the engine alternator is not being driven. It may be possible to regain engine operation in this situation using the BUC and the JFS. The JFS should be started immediately upon entering the JFS envelope. The JFS will then drive the ADG and the engine gearbox which will restore power to the main fuel pump, engine alternator (cockpit rpm signal, EEC power, and ignition), both hydraulic pumps, and 66 a reduced FLCS PMG output. Depending on JFS performance and load, rpm may even be high enough to restore main generator power; however, main generator power may cycle on and off. Without the load of the engine, the JFS will produce a 30-50 percent rpm indication which will be the speed of the engine alternator and not the actual engine rpm. The engine rpm will be unknown. Since the BUC caution light illuminated due to loss of fuel pressure, the BUC caution light will go off when pressure is restored. A UFC airstart is not possible since the rpm signal to the UFC is in error. Perform a BUC airstart, moving the throttle slowly to avoid overtemperature or stagnation. BUC airstarting will be more difficult because of a lack of a true rpm indication and the JFS will not be helping to rotate the engine during the airstart attempt. When FTIT is below 700°C, the airstart can be initiated. Airspeed should be maintained at 250 knots to provide sufficient windmilling rpm. After engine light-off, the throttle should be slowly and smoothly advanced from IDLE to BUC IDLE over a 30-45 second period. Do not shut the JFS off since the JFS is all that is providing fuel pressure. After restarting, engine thrust, throttle response, fuel flow, and FTIT should be normal for BUC operation. Indicated rpm will remain 30-50 percent as long as the JFS run light is on. Maintain 700°C FTIT minimum to assure adequate engine rpm until landing is assured. Land as soon as possible.

AIRSTARTS

There are two airstart options available. Primary is the spooldown airstart, which is when the throttle is advanced from OFF to midrange as rpm is decreasing between 40-25 percent. The second option is a JFS-assisted airstart which differs from a spooldown airstart in that once the JFS is on and is preserving rpm, airspeed can be reduced to 210 knots to achieve best range or 170 knots to achieve best endurance.

The most likely reason to perform an airstart is that the engine has been shut down due to a stagnation. Factors such as altitude, airspeed, weather, etc., must be considered in determining whether to try an airstart, accomplish a flameout landing, or eject. Jettison of stores will reduce altitude loss during an airstart and improve glide ratio during a flameout landing.

Generally, it is best to attempt a UFC start prior to switching to BUC. However, certain UFC problems may require a BUC start. If the engine has seized due to an oil system malfunction or flamed out due to total lack of fuel, either a flameout landing or ejection will be required. After completing an airstart following a stagnation or a flameout, observe restrictions for EEC off operation. A precautionary landing pattern should be flown.

There are critical parameters which apply to any airstart attempt (UFC or BUC). The most important is engine rpm. Below 15 percent, the main engine fuel pump will not supply sufficient fuel to effect an air start and engine ignition will not be available. In general, rpm spooldown rate can be decreased with increased airspeed. A minimum of 420 knots is required to prevent rpm from decaying below 15 percent. If rpm is allowed to drop to near zero, 400-450 knots or more for 10-15 seconds may be required to regain 15 percent. This requires a great

deal of altitude which may not be available. The second parameter is engine temperature. High temperatures during start may cause a stagnation. High temperatures may result if a start is attempted with the STARTING FUEL switch in RICH or if the start is initiated before the FTIT is allowed to decrease below 700°C. If FTIT does not cool down as rapidly as anticipated, verify the throttle is in OFF.

To meet these requirements, an airstart should be initiated at 25-40 percent rpm with FTIT below 700°C. These parameters can usually be achieved by maintaining 300 knots minimum above 30,000 feet or 250 knots minimum below 30,000 feet. (Refer to figure 3-7.) These airspeeds will not maintain rpm above 15 percent; however, they provide the best trade-off between the rate of rpm spooldown and loss of altitude. If it appears that rpm will drop below 25 percent, increase airspeed if feasible and advance the throttle to initiate the airstart even if FTIT is above 700°C. Generally, higher airspeeds (figure 3-7) increase start reliability by slowing rpm spooldown which allows the FTIT to decrease more rapidly. At low altitudes, however, higher airspeeds do not significantly affect the rpm spooldown. Unless required to recover rpm from below 15 percent, airspeed during a UFC start should be at or just above that depicted in figure 3-7. If a BUC spooldown airstart is anticipated, airspeed must be 250-375 knots and altitude below 25,000 feet.

High Altitude Considerations

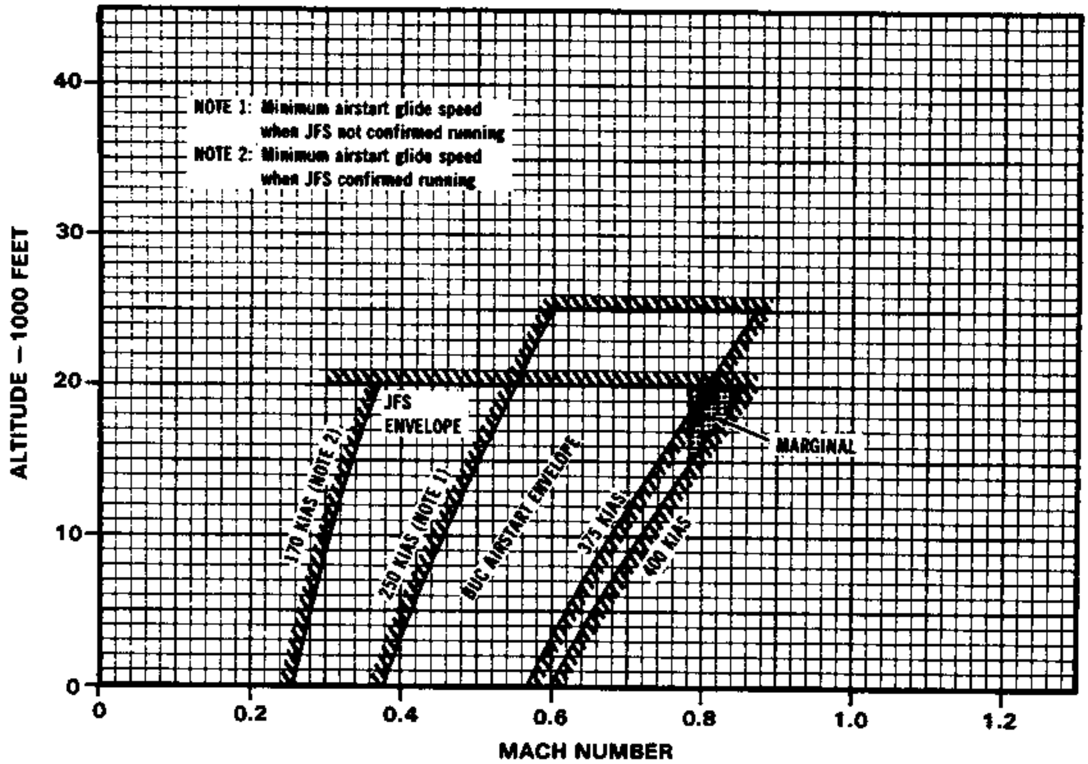
At high altitudes, dive at approximately 30 degrees to gain or maintain 300 knots minimum (250 knots minimum below 30,000 feet). Refer to figure 3-7. Once established, approximately 5-10 degrees of dive should maintain airspeed. The optimum flightpath during airstarting is shown in figure FO-14. Note that airspeed can be reduced to less than 250 knots after a JFS RUN light is confirmed. Unless an airstart is obviously impossible (total lack of fuel, engine seizure, etc.), do not become tempted to establish a maximum range or maximum endurance glide. The first consideration should be an immediate spooldown airstart attempt even if the engine failed for no apparent reason. If airstart airspeed is not maintained, rpm will decrease at a faster rate. The only airstart option available will then be a JFS-assisted airstart. Time constraints due to EPU fuel consumption must be considered. A maximum range or maximum endurance glide from above approximately 35,000 feet may exhaust EPU fuel prior to landing. (Refer to figure A6-3.) At least one UFC start should be attempted. If all UFC airstart parameters (rpm, FTIT, and airspeed) are met and the start is unsuccessful, perform a BUC start below 25,000 feet. When below 20,000 feet, turn the JFS on. Activating the JFS above 20,000 feet is prohibited since successful JFS start/motoring of engine is unlikely and the accumulators will be depleted. If the JFS RUN light illuminates and rpm stabilizes at approximately 27 percent, airspeed may be reduced to best range or best endurance airspeed. With the JFS running, EPU fuel consumption is also reduced.

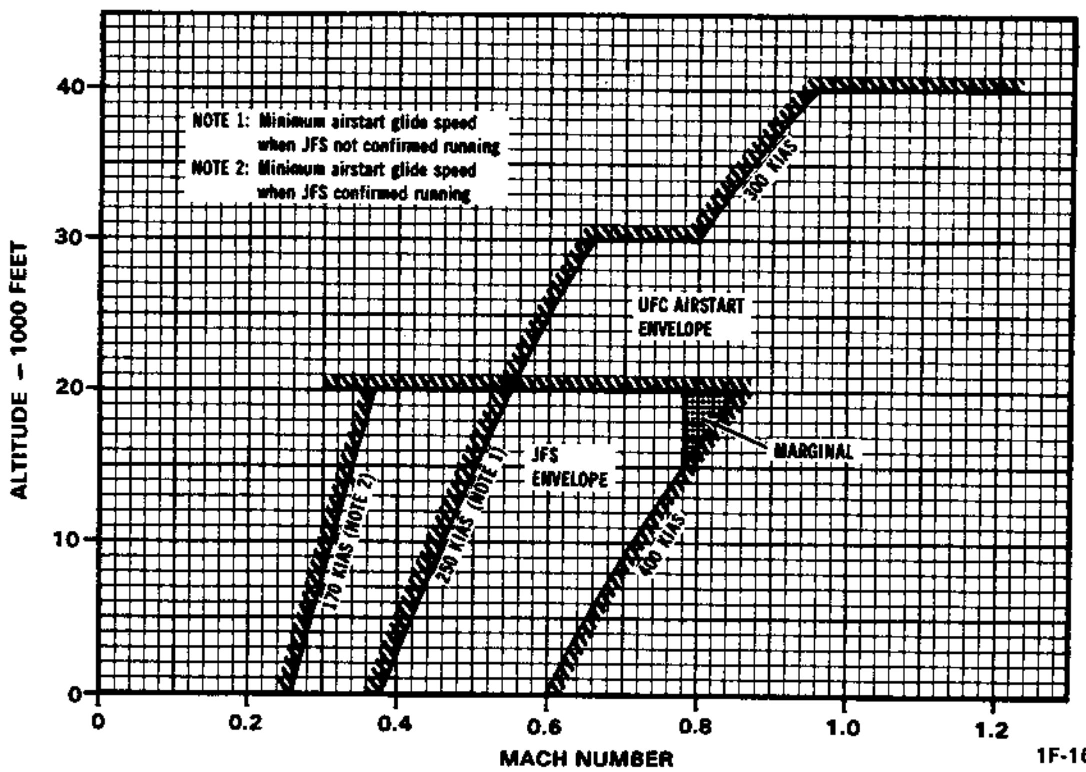
Low Altitude Engine Failure

Refer to figures 3-8 and 3-9. Initial reaction to any malfunction at low altitude should be to climb. Altitude translates directly to either time to achieve an airstart or to glide range to reach a suitable landing field. At low airspeed, the climb may be only enough to insure a safe ejection altitude. Above 300 knots, more time is available by a zoom climb using a 3g pullup to 30-degree climb angle until approaching the desired airspeed (use approximately 30 knots lead point). Below 300 knots, the lead point for the desired airspeed may occur prior to reaching a 30-degree climb angle. Jettison stores as soon as possible to aid in gaining or maintaining altitude and manuever toward a suitable landing field, if available. If the zoom results in an altitude below 5000 feet AGL, there will probably be insufficient time to achieve an airstart prior to minimum recommended ejection altitude. In that case, primary consideration should be given to preparing for ejection; do not delay ejection below 2000 feet AGL. If the zoom results in an altitude between 5000-10,000 feet AGL, there is probably time for one airstart attempt, either UFC or BUC, prior to minimum recommended ejection altitude. This attempt should be in BUC unless an engine stall/stagnation occurred in AB, in which case, a UFC airstart should be attempted. Above 10,000 feet AGL, there is sufficient time for a UFC airstart attempt prior to switching to BUC.

Due to the limited time available and the rapid rpm spooldown rate at low altitude, some additional considerations are required. Below approximately 10,000 feet MSL, rpm decreases rapidly regardless of airspeed and will remain between 40-25 percent for only 5-10 seconds (refer to figure FO-14); therefore, the JFS should be started immediately when below 400 knots. Advance the throttle to initiate the airstart before rpm goes below 25 percent, regardless of JFS operation or FTIT indication. (If the throttle is placed to OFF as soon as a stagnation is recognized, FTIT should decrease rapidly and be below 700°C before rpm reaches 25 percent.) This action should insure that light-off will occur prior to 15 percent rpm.

Airstart and JFS Envelopes





1F-16X-1-0108

Figure 3-7.

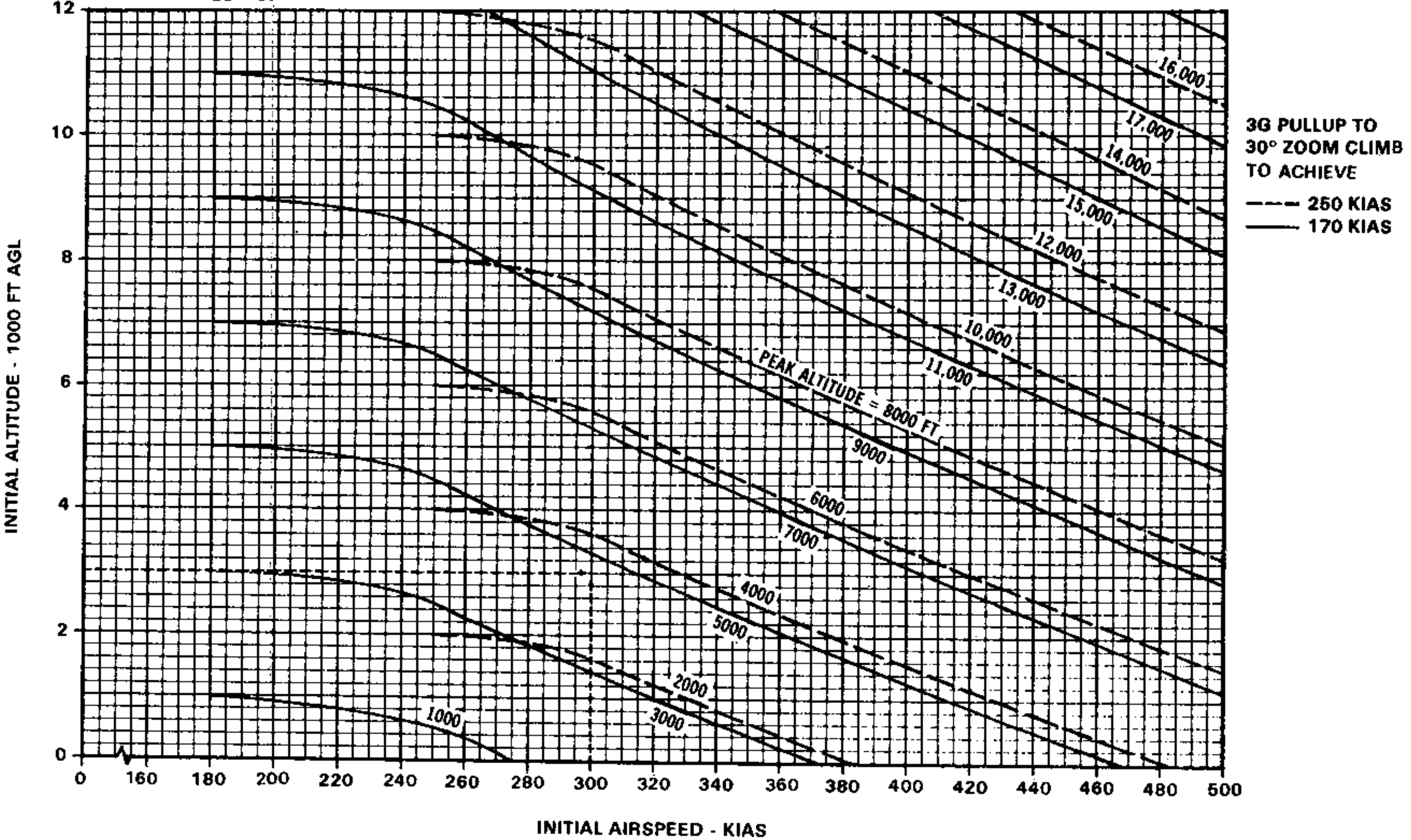
Low Altitude Zoom Capability

DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- GW = 23,000-25,000 LB
- DI = 0-50
- LG – UP

CONDITIONS:
- WINDMILLING ENGINE OR LOCKED ROTOR



1F-16X-1-0627

Figure 3-8.

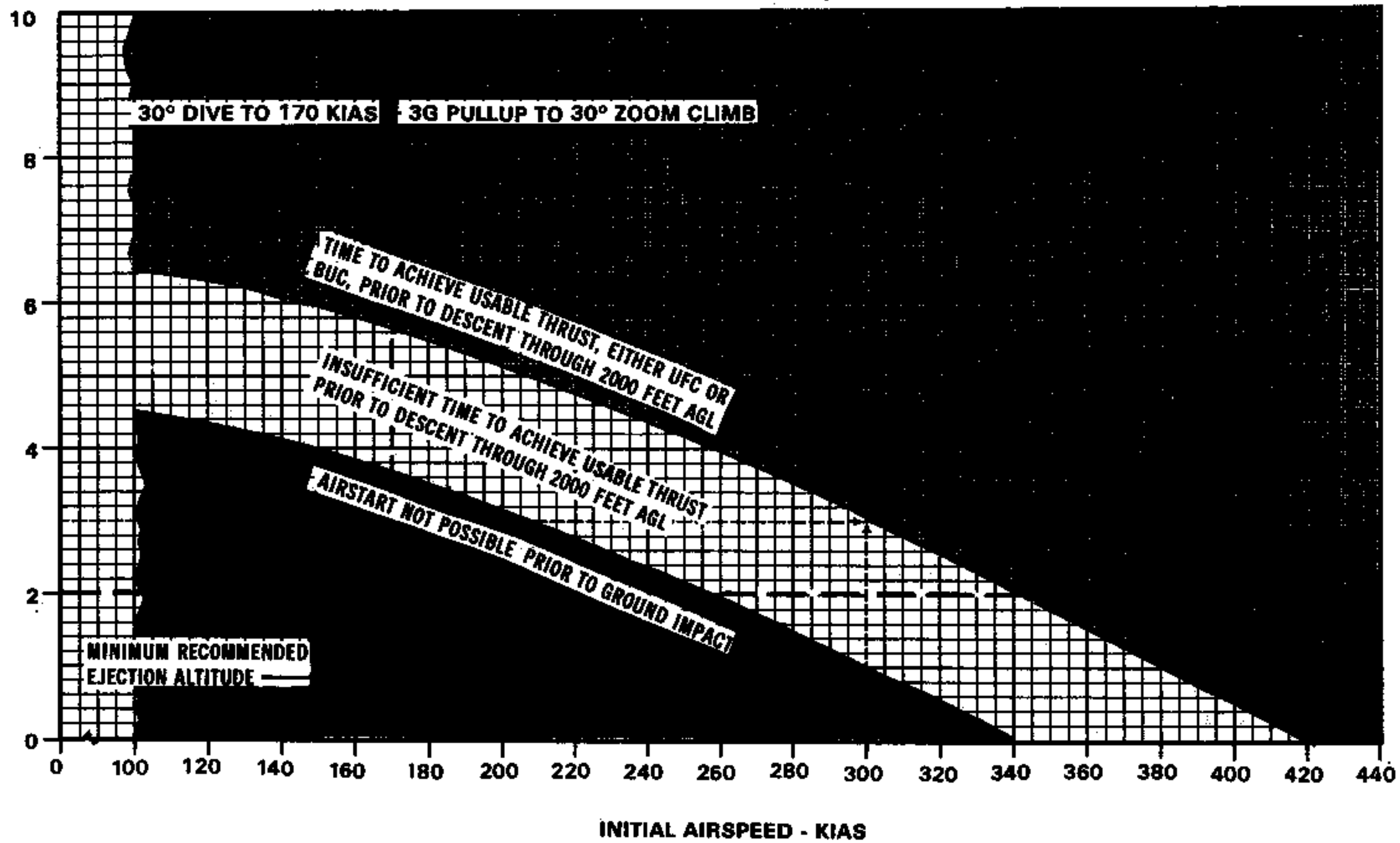
Low Altitude Airstart Capability

DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- GW = 23,000 – 25,000 LB
- DI = 0 – 50
- LG – UP

CONDITIONS:
- DIVE OR ZOOM INITIATED FROM THE SPEED/ALTITUDE EXISTING AT FIRST RECOGNITION OF ENGINE FAILURE (60% RPM)
- AIRSTART INITIATED WHEN RPM REACHES SPOOLDOWN WINDOW (10 SECONDS AFTER INITIATION OF DIVE OR ZOOM)
- 60 SECONDS ASSUMED AFTER THROTTLE ADVANCE TO ACHIEVE USEABLE THRUST
- GLIDE AIRSPEED IS 170 KIAS (JFS OPERATING)



1F-16A-1-0628A

Figure 3-9.

Also, since low altitude rpm decay is relatively independent of airspeed, the zoom climb should be planned to arrive at 210 knots for maximum range or 170 knots for maximum endurance. If a higher airspeed is maintained or an attempt is made to gain airspeed to delay the rpm decay, available time may be reduced to the point that an airstart is not possible. During any low altitude airstart attempt, constantly evaluate altitude above the ground relative to airstart success. Do not delay ejection below 2000 feet AGL unless the engine is producing thrust capable of maintaining level flight or safely controlling the sink rate or unless a flameout landing can be accomplished.

1. Zoom.
2. Stores – Jettison.
3. JFS switch – START 2.
4. Perform airstart (if altitude permits).

WARNING

- Below 10,000 feet AGL, there may not be sufficient time to perform both a UFC and a BUC airstart prior to minimum recommended ejection altitude.
- Below 5000 feet AGL, there will probably be insufficient time to perform an airstart prior to minimum recommended ejection altitude.
- BUC airstarts require very slow throttle movement and more attention to engine instruments than UFC airstarts. Altitude must be carefully monitored.

Airstart – UFC

To perform a UFC spooldown airstart, advance the throttle from OFF to midrange (between IDLE and MIL) when airstart conditions are met. Refer to figure FO-14.

If the throttle is shut off to clear a stagnation, the rpm will decrease rapidly and the FTIT will begin to decrease. The throttle should be maintained in the OFF position for a few seconds even if rpm and FTIT are within airstart limits to allow the stall to clear. If the airstart attempt is not due to a stagnation, FTIT will probably be well below 700°C when the throttle is shut off.

If it appears that rpm will drop below 25 percent, the throttle must be advanced to midrange to preserve rpm. A hot start will probably occur, and the throttle must again be retarded to OFF. However, rpm will be preserved permitting a subsequent airstart within parameters.

When the throttle is advanced to midrange, rpm and FTIT may continue to decrease until light-off occurs which will take up to 15 seconds. Do not rush the start attempt. Increasing rpm is normally the first indication of a start. The light-off is subtle since rpm and FTIT turnaround are very slow. If a light-off is not attained in 15 seconds, position the STARTING FUEL switch to RICH for 5 seconds. If no light-off occurs after 5 seconds in RICH, retard the throttle to OFF and initiate a BUC airstart. From the time the throttle is advanced from OFF, it may take up to 1 minute for light-off and acceleration through idle. Engine acceleration may be slow around 40-50 percent rpm during the start attempt. Do not confuse this slow acceleration with a hung start. If a hung start occurs (stabilized FTIT below 800°C, rpm hung and definitely stabilized below 60 percent), position the STARTING FUEL switch to RICH. If the hung start continues, increase airspeed to a maximum of 400 knots. If a hung start still persists, move the throttle to OFF and initiate a BUC airstart.

If a hot start occurs (FTIT above 800°C) and UFC start parameters were met and altitude is still sufficient, increase airspeed (if possible) and attempt another UFC airstart. If a hot start occurs and UFC start parameters were not met and maintained, attempt another UFC start when inside airstart parameters. If a second hot start occurs or if conditions dictate, such as low altitude or events which indicate a UFC start will not be possible, retard the throttle to OFF and initiate a BUC start.

When the airstart is completed, the JFS should be turned off, the EPU cycled to OFF and then back to NORM, and the STARTING FUEL switch verified in AUTO LEAN.

To accomplish a UFC start:

1. Throttle – OFF.

CAUTION

FTIT should decrease rapidly when throttle is OFF. If FTIT does not decrease rapidly, verify that the throttle is OFF.

2. Airspeed – As required.
   Maintain a minimum of 300 knots above 30,000 feet, 250 knots below 30,000 feet, and 170 knots with JFS running.

NOTE

If maximum gliding range is not a factor, consider maintaining 250 knots above 10,000 feet AGL to reduce rpm spooldown rate (in case of JFS failure). Below 10,000 feet AGL with the JFS running (where only one airstart attempt is likely), maintain a minimum of 170 knots.

3. JFS switch – START 2 (In limits).
   Below 20,000 feet and below 400 knots.

NOTE

- If the JFS switch is erroneously placed to START 1, leave it there.
- If the JFS RUN light does not illuminate within 30 seconds or goes out once illuminated, the JFS start switch must be positioned to OFF for 1 minute to allow the JFS accumulator to recharge. Reattempt START 2.

When FTIT is below 700°C and rpm is 25-40 percent:

4. Throttle – Midrange.

CAUTION

If it appears rpm will go below 25 percent, advance the throttle to midrange regardless of FTIT.

If hung/no start:

5. STARTING FUEL switch – RICH (5 seconds).

6. Airspeed – Increase (400 knots maximum).

If hung/no start persists:

7. Initiate AIRSTART – BUC, this section.

If hot start:
   FTIT above 800°C.

8. Go to AIRSTART – HOT (UFC), this section.

When start is completed:

9. JFS switch – OFF.

10. EPU switch – OFF, then NORM.

11. STARTING FUEL switch – AUTO LEAN.

Airstart – Hot (UFC)

1. Throttle – OFF.

If altitude is still sufficient:

2. Reinitiate UFC airstart.

WARNING

Insure the second start is accomplished in parameters. Increased airspeed (400 knots maximum) may improve airstart capability.

If altitude is insufficient or a second UFC start is unsuccessful:

WARNING

- Below 10,000 feet AGL, there may not be sufficient time to perform both a UFC and a BUC airstart prior to reaching minimum recommended ejection altitude.
- Below 5000 feet AGL, there will probably be insufficient time to perform an airstart prior to minimum recommended ejection altitude.
- BUC airstarts require very slow throttle movement and more attention to engine instruments than UFC airstarts. Altitude must be carefully monitored.

2. Initiate AIRSTART – BUC, this section.

Airstart – BUC

During a BUC airstart, engine airflow (related to airspeed) and fuel flow (regulated manually by throttle) are critical to prevent an overtemperature and subsequent stagnation. For a spooldown BUC airstart, airspeed must be 250-375 knots with alti-

tude below 25,000 feet. To preserve rpm, the JFS should be started at anytime during the airstart sequence if the altitude is less than 20,000 feet. Once the JFS is running, the minimum airspeed during a BUC start is 170 knots. To initiate the airstart, move the throttle to OFF and select BUC with the EEC BUC switch (BUC caution light comes on). The STARTING FUEL switch must be in AUTO LEAN or RICH. (If the switch is in LEAN, the engine will probably light off; however, it may stagnate as the throttle is advanced near the BUC IDLE detent.) Move the throttle to IDLE when rpm is 25-40 percent and FTIT is below 700°C. This can be done above 25,000 feet to preserve rpm, but the aircraft must be flown into the BUC start envelope before further advancing the throttle.

When the throttle is advanced to IDLE, rpm and FTIT may continue to decrease for a brief period. It may take up to 15 seconds to obtain a light-off. The light-off is more subtle than in UFC due to lower minimum fuel flow. The best indication of a light-off is a slow leveling of rpm (spooldown airstart) or an rpm increase (JFS-assisted airstart).

Depending on the type of failure that necessitated a BUC airstart (flameout, stagnation, etc.), FTIT may begin to rise either before or after rpm. The greatest stall margin and probability of a successful airstart result if airstart actions are based on rpm rise rather than FTIT. If rpm is unreliable (e.g., tower shaft failure), FTIT must be used. If light-off does not occur in 15 seconds, continue to very slowly advance the throttle until it does occur. After light-off, stop any throttle movement and allow rpm to increase and begin to stabilize (approximately 10 seconds). This action is critical to increase the stall margin and significantly increases the probability of a successful airstart. If the throttle is advanced immediately after light-off, an engine stall may occur which will preclude a successful airstart since rpm will not accelerate past approximately 45 percent. After rpm begins to stabilize, slowly advance the throttle to maintain a steady rpm rise similar to a normal UFC start. Since fuel flow is directly controlled by the throttle, a concentrated effort will be required to insure that throttle movement is slow and deliberate; a minimum of 30 seconds will be required to advance the throttle from IDLE to BUC IDLE (based on gliding at 250 knots or less). A BUC airstart takes approximately 15-30 seconds longer than a UFC airstart.

Place primary emphasis on controlling the throttle movement to produce a steady rpm rise and carefully monitor FTIT. FTIT will not normally exceed 500°C above 15,000 feet (below 15,000 feet, temperatures as high as 600°C may be required to achieve normal acceleration and starting times). Treat these FTIT's as maximums during the start; rapidly advancing the throttle in an attempt to achieve these FTIT values will probably result in a hot airstart. If it appears that FTIT will exceed these values, stop advancing the throttle and wait for FTIT to stop increasing; then continue the throttle advance. In some cases (such as after a stagnation) where FTIT may be relatively high when the engine lights off, FTIT may remain fairly constant in the 500°-600°C range. As long as rpm continues to increase at a steady rate and FTIT does not rise rapidly, continue advancing the throttle. Do not retard the throttle unless aborting the airstart.

At the backside of the BUC IDLE detent, pause; then rotate the throttle outboard to reduce resistance (the throttle can be pushed through the detent; however, this will probably result in a rapid throttle movement and a hot airstart). RPM may slow down slightly while passing the detent; however, do not be tempted to move the throttle faster. Continue advancing the throttle just as before and monitor FTIT (FTIT is more sensitive to throttle movement during this phase of the airstart). Once past the BUC IDLE detent, normal FTIT limits apply; however, use the same rate of throttle movement until reaching the minimum BUC rpm limit.

If at anytime during the start FTIT exceeds 800°C or rpm stops increasing as the throttle is advanced (stall/stagnation), move the throttle to OFF and reinitiate the airstart if altitude permits. If valid rpm is not available (e.g., tower shaft failure), the airstart will be more difficult to control. Advance the throttle slowly to produce a steady FTIT rise; if FTIT reaches 500°-600°C prior to reaching BUC IDLE, use the above technique to judge how fast to advance the throttle.

After the airstart is complete, set the throttle to maintain level flight (about 80 percent rpm). The throttle may be used as required in the landing pattern; however, throttle movements must be smooth and slow. Do not reduce the throttle to BUC IDLE until landing is assured. Thrust during landing rollout will be higher than normal.

After the airstart is complete, cycle the EPU switch OFF and back to NORM and turn the JFS off unless indicated rpm is below 60 percent with adequate thrust (refer to FLAMEOUT, this section, for discussion of tower shaft failure).

To accomplish a BUC airstart:

1. Throttle – OFF.

CAUTION

FTIT should decrease rapidly when throttle is OFF. If FTIT does not decrease rapidly, verify that the throttle is OFF.

2. Airspeed – As required.
   250-375 knots (170 knots minimum with JFS running).

NOTE

If maximum gliding range is not a factor, consider maintaining 250 knots above 10,000 feet AGL to reduce rpm spooldown rate (in case of JFS failure). Below 10,000 feet AGL with the JFS running (where only one airstart attempt is likely), maintain a minimum of 170 knots.

3. JFS switch – START 2 (In limits).
   Below 20,000 feet and below 400 knots.

NOTE

- If the JFS switch is erroneously placed to START 1, leave it there.
- If the JFS RUN light does not illuminate within 30 seconds or goes off once illuminated, the JFS start switch must be positioned to OFF for 1 minute to allow the JFS accumulator to recharge. Reattempt START 2.

4. EEC BUC switch – BUC.

When FTIT is below 700°C and rpm is 25-40 percent:

5. Throttle – IDLE.

CAUTION

If it appears rpm will go below 25 percent, advance throttle to IDLE regardless of FTIT. Placing the throttle forward of IDLE may result in a hot start.

After light-off:

NOTE

Light-off is indicated by a slow leveling of rpm (spooldown airstart) or an rpm increase (JFS-assisted airstart). Do not use FTIT as an indicatorof engine light-off unless rpm is obviously invalid (e.g., tower shaft failure). If light-off does not occur within 15 seconds, very slowly advance the throttle until it does occur; then stop all throttle movement.

6. Allow rpm to increase and begin to stabilize (approximately 10 seconds).

CAUTION

If the throttle is advanced earlier, the engine may stall, precluding a successful airstart since rpm will not accelerate past approximately 45 percent.

As rpm begins to stabilize:

7. Throttle – Advance slowly to produce a steady rpm rise.

   If above 25,000 feet and/or above 375 knots, maintain throttle at IDLE until BUC airstart envelope (figure 3-7) is entered.

   Advance the throttle slowly and smoothly to the backside of the BUC IDLE detent to produce a steady rpm rise similar to a normal UFC start.

   Monitor FTIT during the start; FTIT should not exceed 500°C above 15,000 feet or 600°C below 15,000 feet. If the throttle is rapidly advanced to obtain these FTIT's, a hot start may result. If FTIT reaches these values, stop throttle advance, wait for FTIT to stop increasing, and then continue the throttle advance.

When at the backside of the BUC IDLE detent:

8. Throttle – Pause, rotate outboard, and smoothly advance past the detent.

NOTE

- Pause (2-3 seconds minimum) at the backside of the BUC IDLE detent to allow FTIT and rpm to stabilize; then rotate the throttle outboard and advance slowly into BUC IDLE.
- Total time to advance the throttle from IDLE to BUC IDLE will be a minimum of 30 seconds.

For a hot start (FTIT above 800°C) or for a stall/stagnation:

9. Throttle – OFF.
10. STARTING FUEL switch – AUTO LEAN or RICH.
11. Reinitiate BUC airstart.

After usable thrust is regained:

CAUTION

Do not turn JFS or EPU off if indicated rpm is below 60 percent with adequate thrust.

12. JFS switch – OFF.
13. EPU switch – OFF, then NORM.
14. Throttle – As required.

CAUTION

- Refer to Section V for BUC operating limits.
- Maintain 80 percent rpm minimum above 15,000 feet and 70 percent rpm minimum below 15,000 feet until landing is assured. Do not exceed 96 percent rpm.
- Avoid rapid throttle movements.
- Use 5 seconds minimum during BUC IDLE to MIL acceleration.
- AB operation is prohibited in BUC.

FLAMEOUT/SFO LANDING

The decision to eject or make a flameout landing rests with the pilot. Consideration for attempting a flameout landing must include:

- Nature of the emergency.
- Weather conditions.
- Proximity of a suitable landing area.
- Proficiency in performing simulated flameout landings.

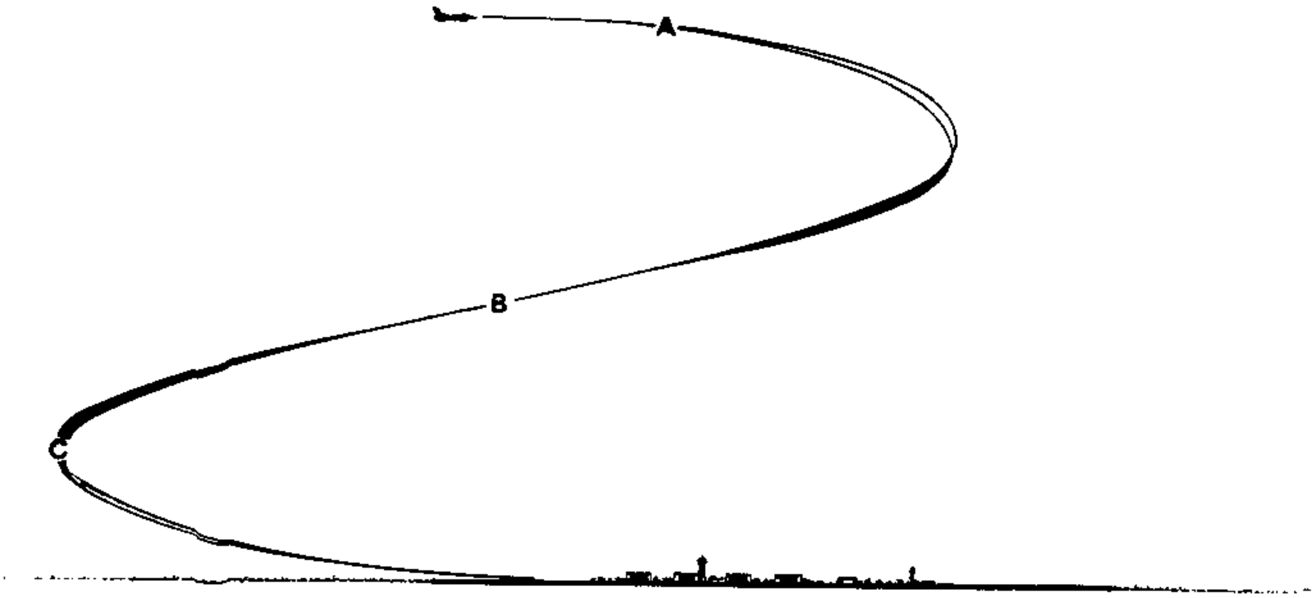
Due to the capabilities of the ejection seat, the entire approach is within the ejection envelope (figure 1-41); however, ejection should not be delayed in a futile attempt to salvage a questionable approach. A flameout landing to a full stop can be accomplished safely on an 8000-foot runway with touchdown 1/3 of the way down the runway.

To perform a flameout landing, turn immediately toward the desired runway. Jettison stores and establish best range speed of 210 knots (add 5 knots per 1000 pounds of fuel/nonjettisonable stores over 3000 pounds). This best range speed equates to 6 degrees AOA (any GW) and provides a glide ratio of approximately 7 NM for each 5000 feet AGL for no wind conditions. Retaining stores or a headwind will decrease glide range significantly. The EPU should be on and, if aircraft fuel is available, the JFS turned on using START 2 when below 20,000 feet MSL. The EPU should provide a minimum of 10 minutes operation with normal demands before EPU fuel depletion. Operating time can be extended to as much as 15 minutes if the JFS is running and flight control inputs are minimized. The JFS will also provide hydraulic pressure for normal brakes and NWS after landing.

There are two basic types of flameout landing patterns (figure 3-10): the overhead approach and the straight-in approach. The overhead approach is preferred as it affords the most opportunities to properly manage available energy while providing the best visual cues for pattern corrections. The overhead approach may be entered at any position, provided the proper altitude for that point in the pattern can be obtained. The main concern is to reach high key, low key, or base key at or above the prescribed minimum altitudes. A straight-in approach is an alternate approach when the overhead approach cannot be attained. For both approaches the initial aimpoint should be approximately 1/3 of the way down the runway from the approach end.

Flameout Landing Pattern (Typical)

(OVERHEAD APPROACH)



A. HIGH KEY - 6000 - 9000 FEET AGL APPROXIMATELY 1/3 RUNWAY LENGTH. 210 KNOTS —CLEAN. 190 KNOTS OPTIMUM (170 KNOTS MIN) — LG DN

B. LOW KEY — 3000-5000 FEET AGL ABEAM TOUCHDOWN POINT. AIRSPEEDS SAME AS HIGH KEY

C. BASE KEY — 2000 FEET AGL MIN, 190 KNOTS — LG-DN

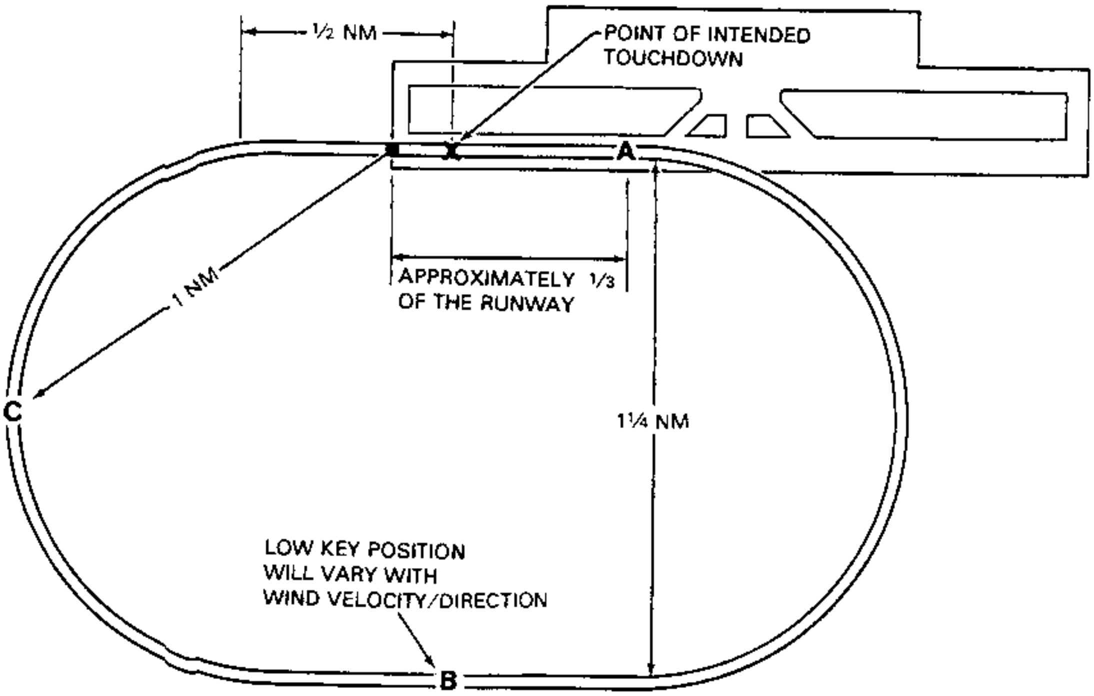


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Figure 3-10. (Sheet 1)

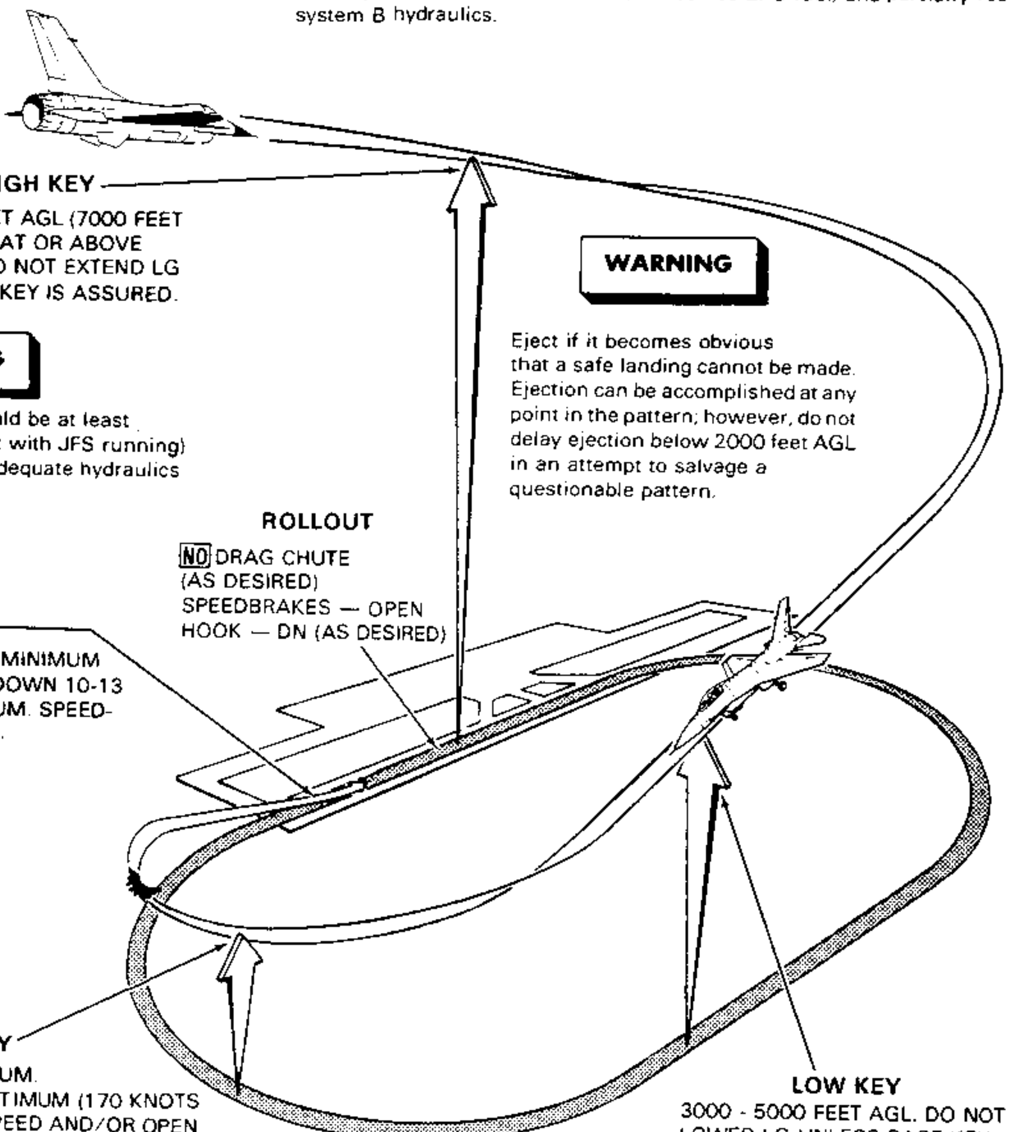
Flameout Landing Pattern (Typical)

(OVERHEAD APPROACH)

WARNING

- The JFS alone does not provide sufficient hydraulics to land the aircraft.
- Do not allow airspeed to decrease below 170 knots.

NOTES:
1. Jettison stores and establish best range speed of 210 knots. Add 5 knots/1000 pounds fuel over 3000 pounds.
2. At best range speed, glide ratio for a clean aircraft is approximately 7 n m for each 5000 feet AGL.
3. With FCC off, HUD continues to compute flight path marker and position scales for use during flameout approach.
4. Frost or condensation could restrict visibility during flameout approach. Place AIR SOURCE knob to RAM and place DEFOG lever forward below 25,000 feet.
5. Time constraints due to EPU fuel consumption must be considered, as well as distance to be covered.
6. Starting JFS reduces load on EPU, conserves EPU fuel, and partially restores system B hydraulics.



HIGH KEY

6000-9000 FEET AGL (7000 FEET AGL DESIRED) AT OR ABOVE 210 KNOTS. DO NOT EXTEND LG UNLESS BASE KEY IS ASSURED.

WARNING

EPU fuel quantity should be at least 25 percent (20 percent with JFS running) at high key to insure adequate hydraulics through landing.

WARNING

Eject if it becomes obvious that a safe landing cannot be made. Ejection can be accomplished at any point in the pattern; however, do not delay ejection below 2000 feet AGL in an attempt to salvage a questionable pattern.

ROLLOUT

$\boxed{\text{NO}}$ DRAG CHUTE (AS DESIRED)
SPEEDBRAKES — OPEN
HOOK — DN (AS DESIRED)

FLARE

MAINTAIN 170 KNOTS MINIMUM UNTIL FLARE. TOUCH DOWN 10-13 DEGREES AOA OPTIMUM. SPEEDBRAKES AS REQUIRED.

BASE KEY

2000 FEET AGL MINIMUM. LG-DN, 190 KNOTS OPTIMUM (170 KNOTS MIN). INCREASE AIRSPEED AND/OR OPEN THE SPEEDBRAKES TO MOVE TOUCHDOWN CLOSER TO APPROACH END OF RUNWAY.

LOW KEY

3000 - 5000 FEET AGL. DO NOT LOWER LG UNLESS BASE KEY IS ASSURED. AIRSPEED 190 KNOTS OPTIMUM (170 KNOTS MIN) WITH LG-DN.

WARNING

Do not delay lowering LG below 2000 feet AGL.

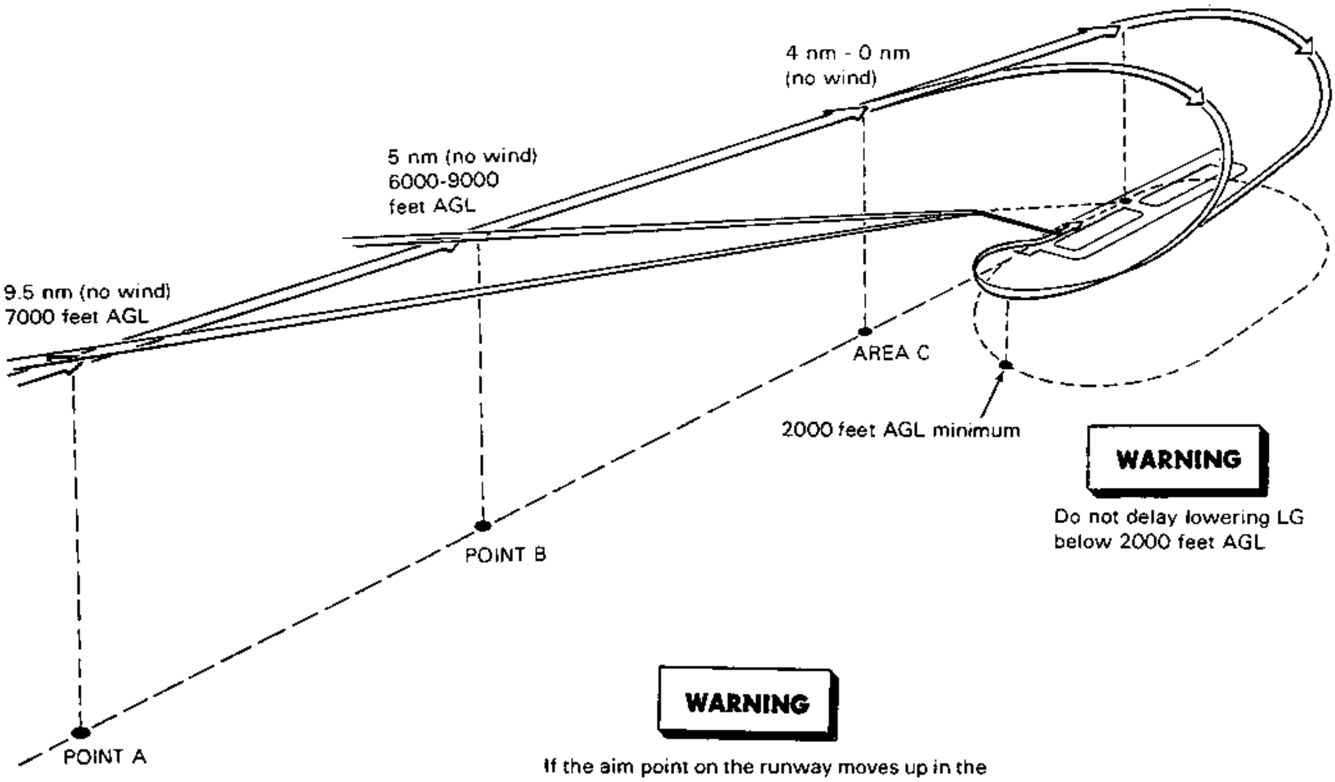
1F-16Y-1-0635

Figure 3-10. (Sheet 2)

Flameout Landing Pattern (Typical)

(STRAIGHT-IN APPROACH)

NOTES:
1. Jettison stores and establish best range speed of 210 knots. Add 5 knots/1000 pounds fuel over 3000 pounds.
2. At best range speed, glide ratio for a clean aircraft is approximately 7 nm for each 5000 feet AGL.
3. After lowering LG, range will decrease by approximately 30 percent; best range speed with wings level is 170 knots.
4. LG down speeds less than 170 knots or greater than 200 knots will significantly increase sink rate and decrease glide range.
5. With FCC off, HUD continues to compute flight path marker and position scales for use during flameout approach.
6. Frost or condensation could restrict visibility during flameout approach. Place AIR SOURCE knob to RAM and place DEFOG lever forward below 25,000 feet.
7. Time constraints due to EPU fuel consumption must be considered, as well as distance to be covered.
8. Starting JFS reduces load on EPU, conserves EPU fuel, and partially restores system B hydraulics.



WARNING

Do not delay lowering LG below 2000 feet AGL

WARNING

Do not allow airspeed to decrease below 170 knots.

WARNING

If the aim point on the runway moves up in the field of view during the approach, the runway probably cannot be reached. This path corresponds to a glide angle of about 7 degrees between the horizon and the aim point.

Eject if it becomes obvious that a safe landing cannot be made. Ejection can be accomplished at any point in the approach; however, do not delay ejection below 2000 feet AGL in an attempt to salvage a questionable approach.

1F-16A-1-0545

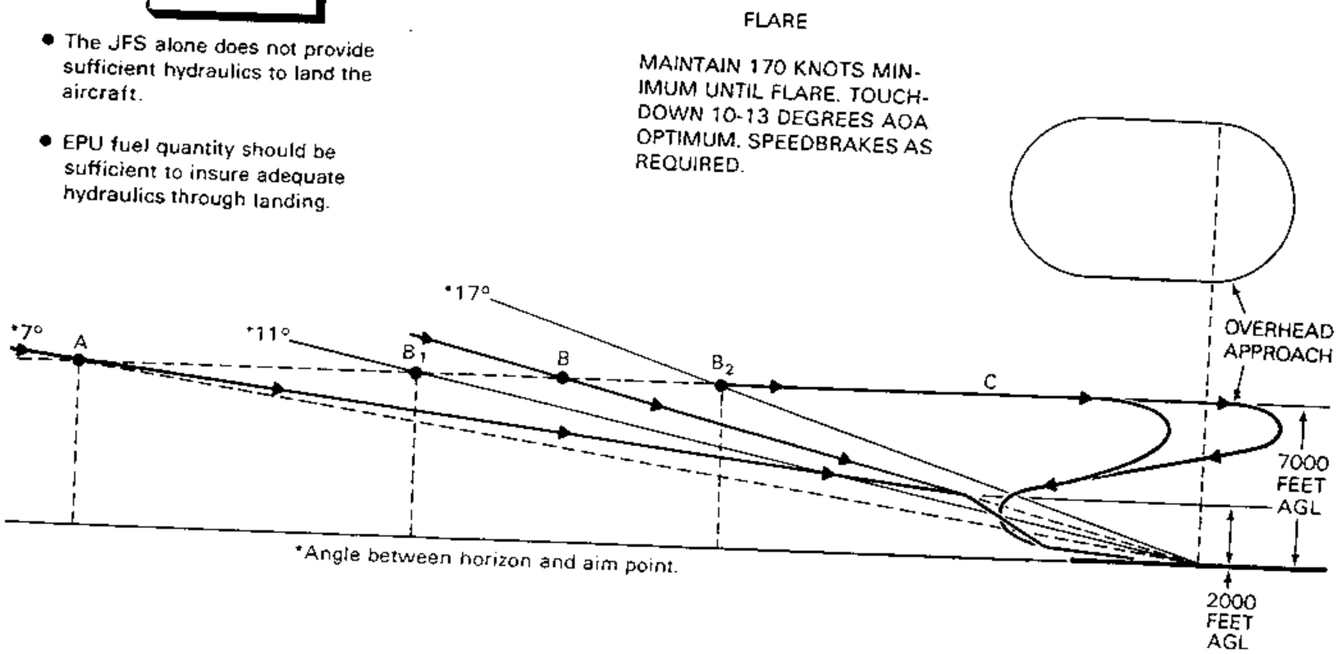
Figure 3-10. (Sheet 3)

Flameout Landing Pattern (Typical)

(STRAIGHT-IN APPROACH)

WARNING

- The JFS alone does not provide sufficient hydraulics to land the aircraft.
- EPU fuel quantity should be sufficient to insure adequate hydraulics through landing.



POINT A

9.5 nm (no wind), 7000 feet AGL, at or above 210 knots clean; continue clean glide until intended touchdown point is 11-17 degrees below horizon (just above radome). Then lower LG and establish 190-knot (170-knot minimum) final approach. As a guide, no wind minimum EPU fuel is 50 percent (45 percent with JFS running).

POINT B

5 nm (no wind), 6000-9000 feet AGL, 210 knots, clean, touchdown point 11-17 degrees below horizon; lower LG and establish 190-knot (170-knot minimum) final approach. As a guide, no wind minimum EPU fuel is:

POINT B_1

6 nm - 40 percent (35 percent with JFS running)

POINT B_2

4 nm - 25 percent (20 percent with JFS running)

AREA C

4 nm-0 nm (no wind), intended touchdown point is more than 17 degrees below horizon (under nose of aircraft and not visible). Normal straight-in approach is not feasible. Options are:

- Plan a lower high key and delay LG extension
- Continue glide to low key for different landing direction
- Extend LG and open speedbrakes and dive and maneuver to intercept a point on the normal flameout landing glidepath

To estimate required EPU fuel for a nonstandard approach, use 15 percent/minute as a basis for computation.

1F-16X-1-0636

Figure 3-10. (Sheet 4)

Overhead Approach

Plan to arrive over the runway at 6000-9000 feet AGL. Refer to figure 3-10. The high key position may be approached from any direction. The recommended high key altitude is 7000 feet AGL which is based on flying a 360-degree pattern from high key with LG down and airspeed of 190 knots (clean configuration). If altitude is significantly above 9000 feet AGL, some form of altitude dissipating maneuver such as a dive, gentle S-turns, or 360-degree turn may be used. Approximately 7000 feet will be lost in a 360-degree turn at 210 knots, using 45 degrees of bank. Speedbrakes may be used to lose excess altitude. However, if the speedbrakes are not closed after a satisfactory high key is reached, the added drag may preclude a successful flameout landing. Avoid rapid control inputs which will use excessive EPU fuel and may exceed the emergency hydraulic pump capability. If EPU fuel quantity is below 25 percent at high key (20 percent with the JFS running), a flameout landing should not be attempted since adequate hydraulics will not be available through landing. With the EPU off, the JFS does not provide adequate hydraulic pressure to land the aircraft.

After departing high key, all attention should be directed toward a successful landing. The ground track of the overhead approach from 7000 feet AGL is approximately the same as that of a normal overhead landing approach except the final approach will only be approximately 1/2 NM long. Optimum airspeed in the pattern is 190 knots after LG is lowered. Although the LG is normally lowered at high key, lowering may be delayed if required to conserve energy.

Straight-In Approach

If one of the overhead approach key positions cannot be made, a straight-in approach can be flown. Refer to figure 3-10. The clean glide should be continued until the touchdown point on the runway is 11-17 degrees below the horizon at which time the LG should be lowered and a glide established. Best range speed with wings level is 170 knots. A good reference for 17 degrees is when the touchdown point is at the bottom of the HUD, just above the radome.

Landing Phase

The LG should be lowered no later than 2000 feet AGL to allow adequate time for alternate LG extension, flight control system changes, and **LESS** 69 retrimming. Maintain a glidepath to achieve the initial aimpoint while maintaining optimum speed of 190 knots. Once wings level on final approach the minimum airspeed is 170 knots. Be aware of the tendency to slow below 170 knots on final approach. Attempting to stretch the glide by allowing the airspeed to decrease below 170 knots increases sink rate and reduces the chance for a successful flare. Once landing is assured, the recommended procedure is to shift the aimpoint from 1/3 down the runway to a position short of the overrun and allow airspeed to increase. Speedbrakes may be used to help control airspeed. If airspeed remains below 200 knots, the aimpoint should be the beginning of the overrun. The higher the airspeed, the shorter the aimpoint should be to allow for additional float (from flare to touchdown). The aircraft is easiest to control in the flare if the flare is begun at 170-200 knots. The point at which the flare is begun depends upon airspeed, sink rate, and glide angle. The flare should be started high enough to allow a smooth gradual reduction in glide angle but not so high as to run out of airspeed prior to touchdown. Under no wind conditions, the aircraft will float 3000-4000 feet after the beginning of the flare at 200 knots if touchdown is at 130-150 knots. Touchdown may be accomplished as soon as the sink rate has been decreased to a normal landing sink rate.

After Touchdown

After touchdown from a flameout landing, aerodynamic braking (and $\boxed{\text{NO}}$ drag chute) may be used. Once the nosewheel is on the runway, select full open speedbrakes. If the JFS and EPU are running, both normal braking and NWS will be available (NWS will be inoperative if the LG was lowered with the alternate LG system). Use normal braking techniques to stop the aircraft. If the JFS is not running, only the brake/JFS accumulators are available to supply hydraulic pressure for braking. Stop the aircraft by making one steady brake application just short of antiskid cycling. When the aircraft is fully stopped, install chocks or set parking brake. Leave the battery on until chocks are installed. If JFS START 2 was attempted but was unsuccessful, no braking will be available for stopping or directional control because brake/JFS accumulators will have been depleted. Use flaperons and rudder as required to maintain directional control. As the aircraft slows below 70 knots, directional control is reduced and the aircraft may drift right.

IMC Penetration

Should IMC be encountered during a flameout approach to the intended runway and no alternate runway is available or expected time en route to

landing exceeds expected EPU operating time, an alternate descent/penetration may be flown which should allow maneuvering airspeed for penetrating the undercast. This penetration should not be attempted unless present position is known and navigation can be performed throughout the descent, and high terrain or other hazards are not a factor. The stores should be jettisoned and the aircraft glided at best range glide speed until a 1:1 ratio between altitude in thousands of feet and range to the runway (i.e., 20,000 feet AGL at 20 NM; 15,000 feet AGL at 15 NM; etc.) is attained. The descent angle should then be increased and airspeed allowed to increase to maintain the 1:1 ratio. This will equate to a 9-10 degree descent angle and airspeed should increase to approximately 300-330 knots. This 1:1 ratio must be maintained to insure maneuvering airspeed is available after penetrating the undercast. Anytime VMC is attained, the aircraft should be slowed to 210 knots and glided to a high key, low key, or base key position. At 3000 feet AGL, the aircraft should be 3 NM from touchdown. If the runway is not in sight by base key altitude, the aircraft may be zoomed for a controlled ejection. If the runway is in sight, a level turn to a base key position should be made. A level turn of up to 180 degrees can be made while maintaining airspeed above 210 knots if the turn is begun above 300 knots and the LG is left retracted. This should be adequate to glide the aircraft to base key for LG lowering and landing.

If an engine has flamed out or if flameout is imminent, turn toward a suitable runway and accomplish the following:

- Altitudes
  - High key – 6000-9000 feet AGL.
  - Low key – 3000-5000 feet AGL.
  - Base key – 2000 feet AGL minimum.
- If a straight-in glide is attempted, delay lowering LG until touchdown point is 11-17 degrees below the horizon (at bottom of HUD, just above radome, with normal glide).

WARNING

Eject if a safe landing cannot be made. Ejection can be accomplished at any point in the pattern but do not delay ejection below 2000 feet AGL in an attempt to salvage a questionable pattern.

1. Stores – Jettison.
2. Airspeed – 210 knots.
   Add 5 knots per 1000 pounds of fuel/stores over 3000 pounds. This equates to approximately 6 degrees AOA.
3. EPU switch – ON.
4. JFS switch – START 2 prior to high key.

WARNING

- EPU fuel quantity should be at least 25 percent (20 percent with JFS running) at high key to insure adequate hydraulic pressure through landing.
- The JFS alone does not provide sufficient hydraulics to land the aircraft.

NOTE

- If engine is not operating, consider placing the FUEL MASTER switch to OFF if a fuel leak exists. This may conserve fuel for the JFS.
- If the JFS is erroneously placed to START 1, leave it there.
- If the JFS RUN light does not illuminate within 30 seconds or goes off once illuminated, the JFS start switch must be positioned to OFF for 1 minute to allow the JFS accumulator to recharge. Reattempt START 2.

5. AIR SOURCE knob – RAM (Below 25,000 feet).
6. DEFOG lever – Forward.
7. LG handle – DN.

WARNING

Do not delay lowering LG below 2000 feet AGL.

8. Airspeed – 190 knots optimum in pattern.

WARNING

Do not allow airspeed to decrease below 170 knots.

After touchdown:

9. HOOK switch – DN (If required).

If accumulator braking is used:

10. Stop straight ahead and set parking brake.

CAUTION

- Brake pedal deflection of 1/16 inch will activate the brakes and bleed the hydraulic accumulators. To avoid brake activation and loss of accumulator fluid, do not rest feet on the brake pedals.
- Do not attempt to taxi clear of the runway using emergency brakes. Loss of accumulator pressure will result in the inability to stop or steer the aircraft.

JETTISON

Selective Jettison

Selective jettison is used to release selected store(s) or suspension equipment in an unarmed or unguided condition.

NOTE

BR Selective jettison cannot be accomplished.

1. MASTER ARM switch – MASTER ARM.
2. BR ARMT CONSENT switch – On.
3. SCP PWR switch – On.
4. DOG FIGHT switch – Center.
5. SEL JETT button – Depress.
6. SCP – WPN/RACK select.

NOTE

- To jettison store(s) from auxiliary racks (TER-9/A, LAU-88/A), select WPN. To jettison the auxiliary racks or store(s) mounted directly on a MAU-12C/A, select RACK.
- 74 To jettison a bomb mounted directly on a MAU-12C/A, either WPN or RACK may be selected.

7. Station(s) – Select.
8. WPN REL button – Depress.

Emergency Jettison

Emergency jettison is a one-step operation that clears all expendable stores and racks except AIM-9 missiles. All weapons will be released unarmed. If the SMS is off, depressing the EMER STORES JETTISON button will turn SMS power on as if the PWR switch had been activated. In addition, while the EMER STORES JETTISON button is depressed, the avionics system will enter the NAV mode. When the EMER STORES JETTISON button is released, the avionics system will return to the previous operating mode. Emergency jettison is not available unless the main or EPU generator is operating.

1. GND JETT ENABLE switch – ENABLE (If required).
   Use EMER STORES JETTISON on the ground only as a last resort.
2. EMER STORES JETTISON button – Depress (1 second).
3. SCP display – Confirm release.

FLCS FAILURES

ADC Malfunctions

A single failure in the air data system (static or impact pressure) will be indicated by the ADC caution light. The CADC caution light will also illuminate for a single AOA malfunction.

A dual failure of static or impact pressure systems will be indicated by the FLT CONT SYS and LE FLAPS caution lights. STBY GAINS light will be illuminated and cannot be reset in flight. LEF's will be zero degrees with the LG handle in UP and the ALT FLAPS switch in NORM. LEF's will be 15 degrees down with the LG handle in DN or ALT FLAPS switch in EXTEND.

A dual failure of AOA sources will be indicated by the ADC, FLT CONT SYS, and LE FLAPS caution lights. The CADC caution light may also come on. The DUAL FC FAIL warning light will also illuminate and can be reset if the malfunction clears.

NOTE

The DUAL FC FAIL, CADC, ADC, FLT CONT SYS, and LE FLAPS lights may illuminate for high AOA and/or side-slip maneuvers. After recovery, reset and continue normal operations.

If DUAL FC FAIL warning light and any FLCP lights are on:

WARNING

Do not attempt SERVO or ELEC RESET if DUAL FC FAIL warning and any FLCP lights are on. This action may cause affected control surface(s) to be inoperative.

1. Do not attempt SERVO or ELEC reset.
2. Land as soon as possible.

If single failure or DUAL FC FAIL warning light is on with no FLCP lights:

3. SERVO ELEC RESET switch – ELEC.

If all lights do not reset or LEF's are not functioning normally:

4. Airspeed – 250 knots minimum (Remain subsonic).
   Airspeed may be reduced to final approach airspeed after the LG is lowered.
5. AOA – 12 degrees maximum.
6. Land as soon as practical.

If DUAL FC FAIL warning light remains on:

7. Land as soon as possible.

CADC Malfunction

1. SERVO ELEC RESET switch – ELEC.
2. If EEC light is on, go to EEC CAUTION LIGHT, this section.

CAUTION

If supersonic, do not retard throttle below MIL.

If CADC caution light goes off:

3. Continue normal operation.

If CADC caution light remains on:

3. AOA – Cross-check with airspeed.
   Use AOA indications with caution.
4. Land as soon as practical.
   Final approach airspeed 125 (B 129) plus 4 knots/1000 pounds of fuel/stores equals 13 degrees AOA (add 8 knots for 11 degrees AOA).

P, R, and Y Malfunctions

Electrical failures in the FLCS are indicated by illumination of the P, R, and/or Y lights on the FLCP. Branch failures can result in momentary, mild movement in the pitch and roll axes. If an axis failure (single light) occurs during maneuvering flight and can be reset, a passive failure has occurred. If the same light illuminates again, it should not be reset. If a branch failure (all three lights) occurs and the lights cannot be reset, one brake in channel 1 or 2 may be inoperative. To reset the lights, position the SERVO ELEC RESET switch on the FLCP to ELEC momentarily. If the light(s) resets, a minor flight control transient may be felt.

If the DUAL FC FAIL warning light also illuminates, power failure in more than one branch may have occurred. Either internal FLCC branch failures or FLCS power supply branch failures will cause the P, R, and Y lights to come on simultaneously. 68 FLCS power supply branch failures may be identified by moving the FLCS PWR TEST switch to TEST and observing which FLCS PWR lights fail to illuminate (the effect of the failure on brakes may be noted at the same time).

NOTE

The P, R, and/or Y light(s) may come on during low altitude flight in proximity to certain HF antennas giving a false indication of FLCS malfunctions. The light(s) should be resettable after leaving the area. Record the altitude, location, and time of the occurrence to aid post-flight analysis.

1. Airspeed – 400 knots maximum (Subsonic).

If DUAL FC FAIL warning light is on:

2. Do not attempt SERVO or ELEC RESET.

WARNING

Do not attempt to reset light(s) if DUAL FC FAIL warning light is on. This action may cause affected control surface(s) to be inoperative.

3. Land as soon as possible.

If DUAL FC FAIL warning light is not on:

WARNING

If maneuvering similar to that which caused the light is not possible, do not reset the light(s). If the light(s) is reset, a subsequent failure in another branch may cause loss of that axis and loss of control.

4. SERVO ELEC RESET switch – ELEC.

If light(s) resets:

5. Maneuver aircraft in affected axes.

If light(s) remains off:

6. Continue normal operation.

If light(s) does not reset or comes on again:

WARNING

If the light(s) is reset more than once, subsequent failure in another branch may cause loss of that axis and loss of control.

7. FCS CAUTION RESET button – Depress.

8. Land as soon as practical.

If P, R, and Y lights are all on:

9. 66 FLCS PWR TEST switch – TEST. Determine brake and brake channel affected.

10. Brakes CHAN switch – Change channels on landing (If required).

Servo Malfunction

A servo failure in a rudder, flaperon, or horizontal tail ISA is indicated by illumination of the appropriate SERVO light on the FLCP. If a single light illuminates during maneuvering flight and can be reset, a passive failure has occurred. If the same SERVO light illuminates again, it should not be reset. If all five SERVO lights are illuminated, one hydraulic system has failed or a momentary drop in hydraulic pressure has occurred.

To reset any FLCS SERVO light, position the SERVO ELEC RESET switch to SERVO while simultaneously depressing the FCS CAUTION RESET button. If the SERVO light(s) resets, a minor flight control transient may be felt.

ISA lockout occurs following a second failure of a servo that has previously been armed and is indicated by illumination of the DUAL FC FAIL warning light. Rudder ISA lockout will cause the rudder to center. Flaperon ISA lockout will cause the affected flaperon to move to 1.5 degrees trailing edge up and will cause the other flaperon to act only as an aileron (to prevent asymmetric TEF extension when the LG handle is placed to DN). Horizontal tail ISA lockout will cause the affected horizontal tail to 70 move to 2 degrees trailing edge up, **LESS** 70 center.

1. Airspeed – 400 knots maximum (Subsonic).

If a hydraulic failure is confirmed:

2. Do not reset, arm, or disarm any servos.

3. Go to SINGLE/DUAL HYDRAULIC FAILURE, this section.

If hydraulic pressures are normal and DUAL FC FAIL warning light is not on:

4. SERVO ELEC RESET switch – SERVO while depressing FCS CAUTION RESET button.

If light(s) resets:

5. Continue normal operation.

If light(s) does not reset or comes on again:

6. Arm the appropriate servo.

7 FCS CAUTION RESET button – Depress.

8. Land as soon as practical.

If DUAL FC FAIL warning light comes on:

9. Do not attempt SERVO or ELEC RESET.

WARNING

Do not attempt to reset SERVO light(s) if DUAL FC FAIL warning light is on. This action may cause affected control surface(s) to be inoperative.

10. AOA – 12 degrees maximum.

WARNING

Landing at greater than 12 degrees AOA may result in inadequate control authority.

11. Jettison asymmetric stores.

12. Land as soon as possible.

NOTE

- If possible, avoid landing in a crosswind with a rudder or flaperon servo lockout. For a locked-out rudder, lower the nose after touchdown and use flaperon and NWS for directional control. With a locked-out horizontal tail, pitch commands will result in roll inputs which are easily compensated for by using flaperons.

- With a locked-out flaperon, TEF's do not extend. Therefore, final approach airspeed will be approximately 20 knots faster than normal. The T.O./LAND CONFIG warning light will illuminate during approach.

13. Go to CONTROLLABILITY CHECK, this section.

LEF's Malfunction (Symmetric)

A symmetric LEF's malfunction may be indicated by the LE FLAPS caution light. This indicates that one or both of the LEF's branches have malfunctioned. LEF's may stop and remain fixed in position when the malfunction occurs. LEF's should remain symmetrical (within 10 degrees).

Certain LEF's malfunctions will not illuminate the LE FLAPS caution light. The presence of higher than normal buffet levels during maneuvering flight and reduced directional stability in the high AOA region are indications that the LEF's have failed to schedule properly.

If LE FLAPS caution light illuminates or a malfunction is suspected (without LE FLAPS caution light on):

1. AOA – 12 degrees maximum.

WARNING

Exceeding 12 degrees AOA will reduce departure resistance. Limit rolling maneuvers to a maximum bank angle change of 90 degrees and avoid rapid roll rates.

2. SERVO ELEC RESET switch – ELEC.

WARNING

Do not attempt SERVO or ELEC RESET if DUAL FC FAIL warning light and any FLCP lights are on. This action may cause affected control surface(s) to be inoperative.

If LE FLAPS caution light resets:

3. Continue flight.

If LE FLAPS caution light does not reset or a malfunction is suspected (without LE FLAPS caution light):

4. Decelerate to subsonic, if supersonic.

5. LE FLAPS switch – LOCK (After LG is down). Lock LEF's in landing configuration at final approach airspeed at a safe altitude. This makes final approach and landing as normal as possible and protects against uncommanded LEF's excursions close to the ground.

6. Land as soon as practical.

7. Check for dc bus No. 2 failure. (Refer to EMERGENCY POWER DISTRIBUTION, this section.)

LEF's Malfunction (Asymmetric)

The most likely cause of an asymmetric LEF's malfunction is a mechanical disconnect in one of the LEF's drive trains. This failure will not illuminate the LE FLAPS caution light. The first indication of an asymmetry is an uncommanded roll. The failed LEF may be as much as 90 degrees up or down. Adequate roll control is available below 10 degrees AOA at subsonic speeds. Use lateral stick for roll control. Use roll trim to reduce lateral stick force as required. Do not attempt to achieve coordinated flight. Avoid using rudder except to aid in maintaining desired ground track during the final part of landing approach. Do not use rudder trim. If the yaw is away from the failed LEF (i.e., nose left yaw with right LEF failed up), rudder inputs to reduce resulting sideslip will actually aggravate the situation by increasing roll control requirements. Accepting some sideslip will reduce roll control requirements. To prevent excessive sideslip, maintain AOA as low as practical. Banked flight will reduce the amount of heading change due to sideslip induced heading drift. Lock the good LEF as close to symmetrical as possible to aid in roll control and to prevent transients caused by automatic scheduling. Monitor fuel consumption since significantly higher thrust will be required to compensate for the increased drag.

Jettison stores and reduce fuel weight as necessary to reduce approach speed. Perform a controllability check. The aircraft will tend to roll into the wing with the least lift. If the LEF is failed up, lift on that wing will be less. If the LEF is failed down, lift on that wing will be more or less depending on the failed LEF position and the position at which the other LEF was locked. If there is a significant crosswind, diminish crosswind effects, if possible, by landing with that wing downwind which has required downtrim to maintain level flight (i.e., if left wing downtrim is required to hold the left wing down, land with the left wing downwind). Fly a shallow, straight-in approach at approximately 8 degrees AOA (no lower than 6 degrees AOA). Immediately prior to touchdown, use rudder as required to align the aircraft with the runway. Reduce the rate of descent somewhat prior to touchdown, as required, but do not flare or raise the nose above 10 degrees AOA because available roll control is reduced and heading drift will increase as AOA increases. Lower the nose immediately after touchdown. Directional control should not be a problem.

1. AOA – 10 degrees maximum.

WARNING

Exceeding 10 degrees AOA may result in insufficient roll authority. Limit rolling maneuvers to gentle roll in with a maximum bank angle of 30 degrees.

2. Lateral stick/roll trim – As required.

WARNING

Avoid rudder inputs. Do not use rudder trim.

3. Lock operating LEF as near symmetrical as possible.
4. Stores – Jettison (If required).
5. Fuel weight – Reduce (If feasible/required).

CAUTION

Reduce fuel weight if fatigue is not a factor. Fuel flow is significantly higher with an LEF failed full up or down and must be considered during recovery.

6. Controllability – Check.
   Lower LG at a safe altitude and check handling qualities at 6-8 degrees AOA.
7. Land as soon as practical.

WARNING

If crosswind component is greater than 10 knots, choose a runway, if possible, that allows the wing trimmed down to be placed downwind (i.e., if left wing downtrim is required to hold the left wing down, land with the left wing downwind). Make a shallow, straight-in approach at approximately 8 degrees AOA (fly no lower than 6 degrees AOA) with minimum roundout for touchdown. Use rudder, as required, to align aircraft with the runway immediately prior to touchdown.

8. Lower the nose immediately after touchdown.

CAUTION

Until WOW, forward stick pressure in excess of approximately 2 pounds will result in full horizontal tails trailing edge down with reduced directional control and wheel braking effectiveness.

If departure-end arrestment is required:

9. HOOK switch - DN.

Trim Malfunction

Trim malfunction will be detected by an increase in stick pressure required to maintain the desired attitude or by a lack of response to stick trim inputs.

1. TRIM/AP DISC switch - DISC, then NORM.

If normal operation is not restored:

2. TRIM/AP DISC switch - DISC.
   Autopilot cannot be engaged.
3. ROLL and PITCH TRIM wheels - As required.

FUEL MALFUNCTIONS

Fuel Leak

A fuel leak may first be noticed by visual means, fuel imbalance, an unexpected FWD or AFT FUEL LOW caution light, or an unusually high fuel flow indication. Monitor the totalizer to determine whether or not a leak exists.

If a fuel leak is suspected (Indicated by abnormally high fuel flow, by totalizer decreasing at abnormal rate, or by visual means):

1. Fuel flow - Minimize.

WARNING

Avoid negative g flight when either reservoir is not full.

If fuel flow is abnormally high:

2. ENG FEED knob - OFF.
   Leak is in the engine feed line or engine components.
3. Land as soon as possible.
   Consider stores jettison if range is critical.
   Consider an SFO (refer to FLAMEOUT/SFO LANDING, this section).

If fuel flow is normal:

2. ENG FEED knob - NORM.

If leak is from the forward system:

3. FUEL QTY SEL knob - Out of NORM.

If external tanks contain fuel:

4. TANK INERTING switch - TANK INERTING.

If external tanks are not installed or when they are empty:

5. AIR REFUEL switch - OPEN.
6. Land as soon as possible.
   Consider stores jettison if range is critical.

If an aft CG results:

7. AOA - 15 degrees maximum.

WARNING

Aft fuel heavy (red zone visible) results in increased susceptibility to departure and deep stall conditions. Limit AOA and avoid maximum command rolling maneuvers.

CAUTION

If two-point aerodynamic braking is used with an aft CG, pitch overshoots may occur and the nozzle, speedbrakes, and ventral fins may contact the runway.

Fuel Low

A fuel low caution light may be caused by a fuel leak, trapped external fuel, an imbalance between the forward and aft system, or a fuel sensing problem.

The FWD FUEL LOW and AFT FUEL LOW caution lights indicate reservoir tank quantities are less than:

A		B	
FWD	400 pounds	FWD	250 pounds
AFT	250 pounds	AFT	400 pounds

1. Fuel flow – Reduce.

WARNING

Limit fuel flow to the minimum required to maintain flight while the cause of the light(s) is determined. Avoid negative g flight when either reservoir is not full.

2. ENG FEED knob – NORM.

3. FUEL QTY SEL knob – RSVR.

If either or both reservoir tanks are low:

NOTE

Fuel flow indications may fluctuate with either reservoir empty.

4. Land as soon as possible.
   Consider an SFO (refer to FLAMEOUT/SFO LANDING, this section).

If a fuel leak is suspected (Indicated by abnormally high fuel flow, by totalizer decreasing at abnormal rate, or by visual means):

5. Go to FUEL LEAK, this section.

If external fuel has not transferred:

6. Go to TRAPPED FUEL, this section.

If forward and aft fuselage fuel are not properly balanced:

7. Go to FUEL IMBALANCE, this section.

If fuel is properly balanced:

NOTE

A fuel line between the reservoir and FFP may be ruptured, causing fuel to cycle between tanks in the same system.

8. Land as soon as possible.

If reservoir tanks indicate full:

4. FUEL QTY SEL knob – TEST.

If test is bad or indicator is inoperative:

5. Land as soon as possible.

If test is good:

6. Individual fuel quantities – Check and compare with totalizer.
   Monitor reservoir tanks to insure they are maintained full.

7. Land as soon as practical.

Hot Fuel or Gravity Feed

Gravity feed from the reservoirs to the engine occurs after loss of the main generator and loss of either hydraulic system A or the FFP. Failure of the FFP may be detected by improper fuel balance. Fuel continues to be transferred to both reservoirs by siphoning action. Fuel distribution cannot be manually or automatically controlled during gravity feed. Minimize aircraft maneuvering for duration of flight. Due to the ingestion of air into the engine fuel system, engine flameout may occur when either reservoir tank empties.

Hot fuel, as indicated by the FUEL HOT caution light, may result from high speed flight or fuel system/heat exchanger malfunctions. Excess fuel temperatures may result in engine malfunctions. Engine flameout may occur at low flow rates associated with the landing pattern due to hot fuel.

Fuel flow above 4000 pph will minimize fuel temperature rise.

1. AIR REFUEL switch – Check CLOSE.

2. TANK INERTING switch – Check OFF.

3. Altitude – 10,000 feet maximum (If practical).
   Minimize aircraft maneuvering for duration of flight.

4. Fuel flow – 4000 pph minimum until landing is assured.

WARNING

Engine flameout may occur at low fuel flow rates or when either reservoir tank empties if a gravity feed condition exists.

If FUEL HOT caution light goes off:

5. Land as soon as practical.

If FUEL HOT caution light stays on or gravity feed situation exists:

5. Land as soon as possible.
   Consider an SFO (refer to FLAMEOUT/SFO LANDING, this section).

Fuel Imbalance

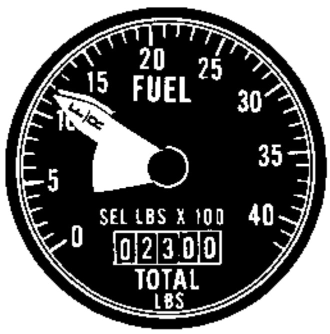
NOTE

LESS 47 Compliance with the fuel management in Section II may result in forward fuel distributions which will uncover the red zone on the AL pointer. These fuel distributions are not considered improper.

A fuel imbalance will be indicated by the red zone of the AL pointer becoming visible (refer to figure 3-11). This may be caused by an FFP malfunction, fuel leak, uneven or partial refueling (either ground or AR), or a failure of the automatic forward fuel transfer system. An unexpected FWD or AFT FUEL LOW caution light may also be an indication of fuel imbalance; however, verify that forward fuselage fuel and aft fuselage fuel (as indicated by AL and FR pointers with fuel quantity select knob in NORM) are not properly balanced, and that a leak does not exist before selecting FWD or AFT ENG FEED.

Fuel Imbalance Indication

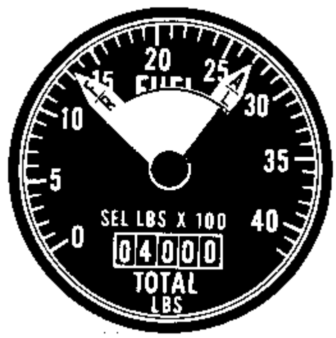
NOTE: Do not exceed 25,000 pph fuel flow while operating in FWD or AFT ENG FEED.



A

FUEL IMBALANCE WARNING (AFT CG)

Fuel imbalance warning (red portion of AL pointer) is visible on high side of top disc when forward tank indication is slightly less than aft tank indication.



B

FUEL IMBALANCE WARNING (AFT CG)

Fuel imbalance warning (red portion of AL pointer) is visible on high side of top disc when forward tank indication is 1350 pounds less than aft tank indication.

1F-16A-1-0111

Figure 3-11.

If fuel imbalance is indicated by AL and FR pointers with FUEL QTY SEL knob in NORM:

1. Fuel flow – Reduce.

WARNING

Limit fuel flow to the minimum required to maintain flight while the cause is determined. Avoid negative g flight when either reservoir is not full.

If aft fuel imbalance exists:

2. AOA – 15 degrees maximum.

WARNING

Aft fuel heavy (red zone visible) results in increased susceptibility to departure and deep stall conditions. Limit AOA and avoid maximum command rolling maneuvers.

If a fuel leak is suspected (Indicated by abnormally high fuel flow, by totalizer decreasing at abnormal rate, or by visual means):

3. Go to FUEL LEAK, this section.

If a fuel leak is not suspected:

4. Fuel quantities – Check.
   Use the FUEL QTY knob to determine if a trapped fuel condition exists. Refer to TRAPPED FUEL, this section, if required.

5. ENG FEED knob – FWD or AFT.
   Use only to correct a forward and aft fuselage fuel imbalance and not to correct imbalances between reservoirs. Do not exceed 25,000 pph fuel flow while balancing fuel.

If imbalance is not corrected:

6. Land as soon as practical.

CAUTION

If two-point aerodynamic braking is used with an aft CG, pitch overshoots may occur and the nozzle, speedbrakes, and ventral fins may contact the runway.

If proper distribution is attained:

6. ENG FEED knob – NORM.

7. Fuel balance – Monitor.

Trapped Fuel

WARNING

With trapped fuel, the totalizer does not indicate total usable fuel. For trapped internal wing fuel, usable fuel is the sum of the FR and AL pointers with the FUEL QTY SEL knob in NORM. For trapped external fuel, usable fuel is the totalizer quantity less the external fuel quantity.

Certain malfunctions can cause fuel to be trapped. The tanks in which fuel is trapped can be detected by a periodic check of external tank fuel quantities.

Accomplish as many of the following steps as required:

1. Fuel flow – Reduce.

2. AIR REFUEL switch – CLOSE.

If fuel is trapped in an external tank:

3. AIR SOURCE knob – NORM or DUMP.

4. AIR REFUEL switch – OPEN (3 seconds), then CLOSE.
   Open AR door below 400 knots/0.85 mach.

5. EXT FUEL TRANS switch – WING FIRST.

6. TANK INERTING switch – TANK INERTING.

7. AIR REFUEL switch – OPEN (1-2 minutes), then CLOSE.
   Open AR door below 400 knots/0.85 mach.

CAUTION

If repositioning the switches does not correct the trapped external fuel condition, then internal fuel is the only usable fuel available.

NOTE

Monitor totalizer reading for evidence of fuel venting and monitor fuel pointers for possible lateral fuel imbalance if configured with both 300-/370-gallon fuel tanks.

8. Stores – Jettison (If required).

9. Land as soon as practical.

If fuel is trapped in an internal wing tank:

3. TANK INERTING switch – TANK INERTING (3 seconds), then OFF.

4. TANK INERTING switch – TANK INERTING (1-2 minutes), then OFF.

NOTE

If either action results in fuel transfer, that action may be repeated.

5. Stores – Jettison (If required).

6. Land as soon as practical.

HYDRAULIC MALFUNCTIONS

A hydraulic system failure will be indicated by illumination of the HYD/OIL PRESS warning light, FLT CONT SYS, and all five SERVO lights. The HYD/OIL PRESS warning light illuminates whenever either hydraulic system pressure drops below 1000 psi. The SERVO lights may illuminate prior to the HYD/OIL PRESS warning light. Do not attempt to reset servos.

Single Hydraulic Failure

SYSTEM A FAILURE

The FLCS ISA's will be operating in the nonredundant mode and the speedbrakes and FFP will be inoperative.

1. Do not reset servos.

2. Land as soon as practical.
   Make smooth control inputs and plan to fly a straight-in approach.

3. System B hydraulic pressure – Monitor.

4. Fuel balance – Monitor.
   Fuel distribution must be controlled manually.

SYSTEM B FAILURE

The FLCS ISA's will be operating in the nonredundant mode and normal braking, NWS, AR door operation, gun operation, and normal LG extension will be lost. **NO** Drag chute operation will be normal using drag chute accumulator pressure. Braking will be available using brake/JFS accumulator pressure. The fully charged accumulators contain sufficient fluid for at least five brake applications of 15-second duration each. However, to minimize consumption of brake accumulator fluid, braking should be accomplished with as few applications as possible. Use aerodynamic braking to the maximum extent possible. A single moderate and steady brake application without cycling the antiskid should then be applied. After stopping, set the parking brake. If there is reason to believe that the brake/JFS accumulators have been depleted or that directional control may be a problem, an approach-end arrestment should be considered.

1. Do not reset servos.

2. Land as soon as practical.
   Make smooth control inputs and plan to fly a straight-in approach.

3. HOOK switch – DN (If required).
   Braking will be available using brake/JFS accumulators only. To avoid brake activation and loss of accumulator pressure, do not rest feet on brake pedals. If the accumulators have been depleted or if directional control may be a problem, consider an approach-end arrestment. (Refer to CABLE ARRESTMENT, this section.)

4. LG handle – DN (Use DN LOCK REL button if required).

WARNING

If LG handle will not lower, select BRAKES CHAN 2 and position ALT FLAPS switch to EXTEND. Nozzle will remain closed, resulting in higher than normal landing thrust.

5. ALT GEAR handle – Pull (190 knots maximum).

After landing:

6. Stop straight ahead and set parking brake.

CAUTION

- Brake pedal deflection of 1/16 inch will activate the brakes and bleed the brake/JFS accumulators. To avoid brake activation and loss of accumulator pressure, do not rest feet on brake pedals.
- Do not attempt to taxi clear of the runway using emergency brakes. Loss of accumulator pressure will result in the inability to stop or steer the aircraft.

Dual Hydraulic Failure

A dual hydraulic system failure can be detected by sluggishness or lack of response to flight control inputs, decreasing pressure readings on both hydraulic pressure gages, and associated warning and caution lights. The EPU will provide hydraulic pressure for system A when pressure of both hydraulic systems drops below 1000 psi. The systems affected by dual hydraulic system failure after the EPU is running are the same as those affected by system B failure. Refer to SYSTEM B FAILURE, this section.

1. EPU switch – ON (If run light is off).

2. System A hydraulic pressure – Check increasing.

If pressure does not increase or control response is lost:

3. Eject.

If system A hydraulic pressure is restored:

3. Do not reset servos.

4. Land as soon as possible.
   Make smooth control inputs and plan to fly a straight-in approach.

5. HOOK switch – DN (If required).
   Braking will be available using brake/JFS accumulators only. To avoid brake activation and loss of accumulator pressure, do not rest feet on brake pedals. If the accumulators have been depleted or if directional control may be a problem, consider an approach-end arrestment. (Refer to CABLE ARRESTMENT, this section.)

6. LG handle – DN (Use DN LOCK REL button if required).

WARNING

If LG handle will not lower, select BRAKES CHAN 2 and position ALT FLAPS switch to EXTEND. Nozzle will remain closed, resulting in higher than normal landing thrust.

7. ALT GEAR handle – Pull (190 knots maximum).

8. If EPU runs abnormally, go to ABNORMAL EPU OPERATION, this section.

After landing:

9. Stop straight ahead and set parking brake.

CAUTION

- Brake pedal deflection of 1/16 inch will activate the brakes and bleed the brake/JFS accumulators. To avoid brake activation and loss of accumulator pressure, do not rest feet on the tip of the brake pedals.
- Do not attempt to taxi clear of the runway using emergency brakes. Loss of accumulator pressure will result in the inability to stop or steer the aircraft.

System B and Main Generator Failure (PTO Shaft)

If hydraulic system B and the main generator are lost and EPU run light illuminates, a PTO shaft failure is indicated (66 FLCS PMG light also illuminates).

1. AOA – 12 degrees maximum (200 knots minimum).

WARNING

Do not exceed 12 degrees AOA until LEF's are reset. Departure susceptibility is increased with LEF's locked. Limit rolling maneuvers to a maximum bank angle change of 90 degrees and avoid rapid roll rates.

2. EPU switch – ON (If run light is off).

3. System A hydraulic pressure – Check increasing.

If pressure does not increase and control response is lost:

4. Eject.

If system A hydraulic pressure is restored:

5. RPM – 80 percent maximum.

CAUTION

- Higher rpm may cause the PTO shaft to break loose and flail.
- Short throttle excursions to 85 percent rpm are allowed but should be minimized.

6. Do not reset servos.

7. SERVO ELEC reset switch – ELEC.
   Resets LEF's and LE FLAPS, CADC, and ADC caution lights (if on).

8. EEC BUC switch – OFF, then EEC.

CAUTION

EEC stall protection may be lost. Do not retard throttle below MIL until subsonic. Set throttle at midrange prior to cycling EEC BUC switch.

9. Fuel balance – Monitor.

10. Land as soon as possible.
    Make smooth control inputs and plan to fly a straight-in approach.

11. HOOK switch – DN (If required).
    Braking will be available using brake/JFS accumulators only. To avoid brake activation and loss of accumulator pressure, do not rest feet on brake pedals. If the accumulators have been depleted or if directional control may be a problem, consider an approach-end arrestment. (Refer to CABLE ARRESTMENT, this section.)

12. LG handle – DN (Use DN LOCK REL button if required).

WARNING

If LG handle will not lower, select BRAKES CHAN 2 and position ALT FLAPS switch to EXTEND. Nozzle will remain closed, resulting in higher than normal landing thrust.

13. ALT GEAR handle – Pull (190 knots maximum).

14. If EPU runs abnormally, go to ABNORMAL EPU OPERATION, this section.

After landing:

15. Stop straight ahead and have chocks installed (or set parking brake).

16. EPU switch – OFF.

INS FAILURES

There is a large number of failure modes of the INS, but computer and platform failures will be apparent and affect flight operations significantly.

INS Computer Failure

A failure of the INS computer with the inertial platform operating properly is indicated by the AVIONICS caution light, fault code 030 on the FCNP, AUX flag on the ADI, loss of magnetic heading indication in the HUD, and possibly a compass card jump. The INS will normally switch automatically to the alternate (attitude) mode. In this condition, the HSI compass card will be operative but must be oriented to the heading on the magnetic compass while in straight and level flight using the HDG set knob. Full TACAN operation will be available and attitude may be displayed normally on the ADI even though the AUX flag will be in view.

If the INS computer fails:

1. Cross-check attitude indications.

2. INSTR MODE HDG set knob - Slew HSI to proper heading.

Total INS Failure

A total INS failure (computer and inertial platform) is normally indicated by the AVIONICS caution light, any INS fault code with severity of 1 on the FCNP, and the ADI OFF and AUX flags in view. The HSI compass card and bearing pointer and the ADI will freeze. Magnetic heading will be displayed only on the magnetic compass. Attitude reference will be available only on the SAI. Since the HSI course deviation indicator, range indicator, and TO-FROM indicator will be operative, the capability to fly an inbound (or outbound) radial to (or from) a TACAN station will be available.

WARNING

It is possible for the primary attitude and/or heading to be in error with no ADI OFF or AUX flags displayed.

1. INS PWR pushbutton - Off (1 minute).

2. FCNP FUNCTION knob - ATTD (cw).

3. INS PWR pushbutton - On.

4. Attitude - Straight, level, and unaccelerated (75 seconds).
   ADI OFF flag will be out of view after approximately 35 seconds.

5. ADI - Verify attitude information correct.

WARNING

ADI may fail without ADI OFF or AUX flag displayed. Only the HSI CDI, range indicator, and TO-FROM indicator will be operative.

If platform erects:

6. Go to INS COMPUTER FAILURE, this section.

If platform fails to erect:

7. INS PWR pushbutton - Off.

OUT-OF-CONTROL RECOVERY

The aircraft may depart in either yaw or pitch. After the aircraft departs in pitch, it will either self-recover, deep stall, or spin. A yaw departure is characterized by abrupt onset of large sideslip and sideforce and neutralization or reversal of roll motion. The aircraft will usually self-recover if the stick is released. However, a sideslip-induced roll of 90 degrees or more may be experienced before the aircraft is completely under control. If the stick is not released promptly following a yaw departure, the aircraft may transition into an upright or inverted pitch departure.

In order to minimize time and altitude loss following a departure, neutralize controls by removing stick or rudder commands or by completely releasing the stick and rudder controls to determine the out-of-control conditions in the quickest manner. While momentary AOA excursions above 29 degrees may go unnoticed, uncommanded pitch, roll, and yaw movements are the best indications of an out-of-control condition. The most common occurrence following a departure is a quick self-recovery. When recovery occurs, fly the aircraft at a low AOA/pitch attitude to prevent another departure and recover when flying airspeed has been attained. Self-recovery will be quick and obvious: the nose will drop and the AOA will remain below 25 degrees. After recovery, flight control lights may be illuminated. Assess the flight condition by referring to aircraft motion, AOA, and airspeed. If the out-of-control condition persists (i.e., AOA indicator is pegged while airspeed is low), then the aircraft is in a deep stall or spin. Additionally, if the nose drops and then comes back up (with AOA pegged), the aircraft is in a deep stall or spin. The AOA indicator will normally be pegged at approximately 32 degrees for an upright deep stall or spin or at -5 degrees for an inverted deep stall or spin. Airspeed will normally be less than 100 knots in a deep stall. During oscillatory deep stalls or spins, the AOA may momentarily come off the peg and airspeed may climb as high as 150 knots, but the aircraft will still be out of control. Departures at high altitude may result in an engine stall or stagnation. The maximum engine stall margin is maintained at MIL. The EEC self-clearing functions operate only at MIL. If in AB during a departure, retard the throttle to MIL. If in MIL, do not select AB even if the departure is a result of low airspeed. If the throttle is at an intermediate setting at departure, do not move the throttle. The use of AB during a spin or deep stall is not normally recommended; however, do not hesitate to use AB if upright and below 20,000 feet MSL and recovery is not imminent.

Upright Out of Control

An upright pitch departure will result in one of the following: (1) recovery to normal flight, (2) a spin if a large lateral asymmetry exists, or (3) a deep stall. The AOA indicator will read approximately 32

degrees. The aircraft may exhibit some pitch and roll oscillations and rotate slowly in yaw. An upright spin is usually characterized by slow yaw rates, generally resulting in one turn in 10-15 seconds. The yaw rate limiter provides antispin controls and will generally stop the yaw rotation within two turns but an upright deep stall condition may then exist. Rapidly increasing yaw rates and entry into a fast, flat (and possibly unrecoverable) upright spin may be possible following departure with large asymmetric loadings. An upright or positive AOA deep stall may be either stable or highly oscillatory in pitch depending upon the CG location. With centerline stores, the deep stall will be highly oscillatory in yaw and roll. In any case, the deep stall is characterized by a load factor of 1g, AOA indicator pegged at approximately 32 degrees, and an airspeed of 50-150 knots. If the deep stall is stable in pitch, the aircraft will be at a large positive AOA, the nose will be slightly above the horizon, and the wings will generally be level. If the deep stall is oscillatory in pitch, the AOA may vary by as much as ±30 degrees about some nominal value, the nose may oscillate about the horizon by as much as ±30 degrees, and there may be accompanying roll oscillations. Oscillatory deep stalls will be more difficult to recognize than stable deep stalls because of the misleading appearance of recovery as the nose momentarily oscillates below the horizon toward the ground.

The rudder authority limiter will prevent pilot yaw inputs until the MPO switch is placed to OVRD (with AOA above 29 degrees). Pedal-commanded rudder deflection is then possible; however, do not make rudder inputs since they may delay an MPO recovery.

The aircraft can be rocked out of a deep stall. With the MPO switch held in OVRD, the horizontal tails position can be controlled. The AOA can be increased by pulling back on the stick. Because the AOA indicator is pegged at approximately 32 degrees, the only indication of an AOA increase is pitch attitude. At the maximum pitch attitude, push full forward on the stick. Most deep stalls are oscillatory in pitch, roll, and yaw, and it may be very difficult to determine an increase in pitch attitude. If no increase is noted, hold aft stick for approximately 3 seconds and then push full forward on the stick to generate a nosedown pitch rate. The nosedown pitch rate should carry the AOA below the deep stall AOA and recover the aircraft. If the nose does not continue down but reverses and starts up, pull back on the stick to continue the cycle of rocking the aircraft. Rapid fore and aft cycling of the stick will not be effective. The natural pitching motion of the aircraft normally reverses every 2-3 seconds. Normally, only one or two correctly applied cycles are required to break a deep stall. A recovery will be characterized by the nose pitching toward the ground to a steep dive angle, increasing airspeed, and decreasing AOA to less than 25 degrees. The nose may momentarily hesitate in its downward movement during a normal recovery. Do not reapply aft stick unless the nose reverses. When recovery is confirmed, release the MPO switch, maintain neutral roll and yaw commands, and apply pitch commands as required to keep the nose at a low AOA. Do not apply excessive forward or aft stick pressure which may cause the aircraft to tuck under or redepart. If altitude permits, allow the aircraft to accelerate to 200 knots or more and recover from the resulting dive.

Inverted Out of Control

An inverted pitch departure will result in one of the following: (1) recovery to normal flight, (2) an inverted spin, or (3) an inverted deep stall.

An inverted spin should only occur if prospin controls are held or a large lateral asymmetry exists. An inverted spin is characterized by an inverted attitude, a large negative AOA (indicator pegged at -5 degrees), load factor of -1g, and a nominal position of the nose slightly below the horizon. A slow yaw rotation and significant pitch oscillations are typical; however, a fast, flat, inverted spin is possible. If the aircraft is rotating, apply rudder opposite the rotation (opposite turn needle) which should stop the yaw rate. By neutralizing the rudder as the yaw rate stops, the aircraft will either recover or remain in a deep stall condition.

An inverted or negative AOA deep stall may be either stable or highly oscillatory in pitch, depending upon the CG location. In either case, the deep stall is characterized by a load factor of -1g, AOA indicator pegged at -5 degrees, and an airspeed of 50-150 knots. If the deep stall is stable in pitch, the aircraft will be at a large negative AOA, the nose will be slightly above the horizon, and the wings will generally be level. If the deep stall is oscillatory in pitch, the AOA may vary by as much as ±20 degrees about some nominal value, the nose may oscillate about the horizon by as much as ±20 degrees, and there may be some accompanying roll oscillations. Oscillatory deep stalls will be more difficult to recognize than stable deep stalls because of the misleading appearance of recovery as the nose momentarily oscillates below the horizon toward the ground. Very little yaw rate will be evident unless roll and yaw controls are not neutral.

The aircraft can be rocked out of an inverted deep stall in a manner similar to the upright deep stall recovery. In this case, hold the MPO switch in OVRD and push full forward stick. At the peak pitch attitude (approximately 20 degrees above the initial attitude), pull full aft stick to generate a pitch rate to break the deep stall. If the nose hesitates and begins to reverse direction, push forward on the stick to continue the cycle of rocking. A recovery will be characterized by the aircraft pitching toward the ground in a steep dive angle, increasing airspeed, and increasing AOA to above -5 degrees. When recovery is confirmed, release the MPO switch. If altitude permits, allow the aircraft to accelerate to 200 knots or more and recover from the resulting dive.

On recovery from an inverted deep stall or spin, the aircraft may pendulum to an upright departure or deep stall. When the nose is well below the horizon, control the pitch rate with forward stick to establish a dive. If the pitch rate begins to increase rapidly, use of full forward stick may be necessary to prevent an upright departure or deep stall.

Out-of-Control Recovery

In the event of a departure from controlled flight, accomplish as much of the following as required to effect a recovery.

WARNING

If recovery is not apparent at or below 10,000 feet AGL, eject.

Engine may stall while out of control.

1. Controls - Neutral.

2. Throttle - MIL if in AB.
   If other than AB, do not move the throttle.

If in an inverted deep stall:
Negative g and AOA indicator pegged at -5 degrees.

3. Rudder - Full opposite turn needle.
   Neutralize rudder as rotation stops and then as required to minimize rotation.

If in an upright deep stall or still in an inverted deep stall:
Positive g, AOA indicator pegged at 32 degrees (upright), or negative g, AOA indicator pegged at -5 degrees.

4. MPO switch - OVRD and hold.
   Maintain firm pressure.

WARNING

If upright, applying rudder with the MPO engaged may delay recovery.

5. Stick - Cycle in phase.

   - If upright, pull aft. Push full forward at peak pitch attitude (approximately 20 degrees above initial attitude).
     - If sufficient nosedown movement is not achieved, pull when the nose is at its lowest point and then push when the nose is at its highest point.
   - If inverted, push full forward. Pull full aft at peak pitch attitude (Approximately 20 degrees above initial attitude).
     - If sufficient nosedown movement is not achieved, push when the nose is at its lowest point and then pull when the nose is at its highest point.

OXYGEN MALFUNCTION

The OXY LOW caution light indicates oxygen quantity below 0.5 liter or pressure below 42 psi.

If the OXY LOW caution light illuminates:

1. Cockpit pressure altitude - 10,000 feet maximum.

If unable to descend immediately:

2. Emergency oxygen - Activate.

3. Oxygen hose - Disconnect.

WARNING

If emergency oxygen is activated while still in the cockpit, the aircraft oxygen hose must be disconnected to allow exhalation.

SMOKE OR FUMES

All unidentified odors will be considered toxic. Do not take off when unidentified odors are detected. Do not confuse condensation from the ECS with smoke.

1. OXYGEN – 100%.
2. Altitude – 25,000 feet maximum.
3. Airspeed – 500 knots maximum.
4. AIR SOURCE knob – RAM.
   External fuel cannot be transferred in OFF or RAM. Consider jettisoning tanks to decrease drag if range is critical and the ECS cannot be turned on for short periods of time to transfer fuel.
5. Nonessential electrical equipment – Off.

NOTE

If in VMC and the ADI and HSI are not required for flight, the INS should be considered nonessential.

6. Determine cause of smoke or fumes and correct (if possible).
7. Land as soon as possible.

If cockpit visibility precludes safe operation:

8. Airspeed – 180 knots maximum.
9. Seat – Full down.
10. TEF's – Extend.
11. Canopy – Jettison.

VOICE WARNING/CAUTION MESSAGE 57

When a voice WARNING or CAUTION message is heard, check cockpit indications; then refer to the appropriate emergency procedure for corrective action.

LANDING EMERGENCIES

PRECAUTIONARY LANDING PATTERN

The type of pattern flown in an emergency depends on several factors: type of malfunction, weather conditions, day or night, suitability and proximity of a landing field, and fuel status. Generally, the pattern will be one of three types: a normal straight-in approach, a higher than normal straight-in approach, or an SFO.

STRAIGHT-IN LANDING

A straight-in landing is recommended for emergencies which dictate minimum maneuvering inputs such as hydraulic, flight control, or electrical problems or situations which result in a relatively high thrust level being maintained to touchdown such as a stuck or closed nozzle. When flying a straight-in approach, airspeed and altitude should be increased as required to allow for a safe ejection to as late a point in the pattern as possible. A controllability check should be accomplished prior to commencing the approach if minimum flying airspeeds or control difficulties have been experienced or are anticipated.

SIMULATED FLAMEOUT LANDING

Anytime engine failure is anticipated (abnormal response, oil system failures, low fuel, etc.), an SFO should be used. Turn the EPU and JFS on at or just prior to high key and verify their operation. If the engine is still running at touchdown, the JFS will shut down at WOW.

If an SFO pattern is not possible, a higher than normal final approach should be flown. This type pattern should result in a final approach that looks very much like a flameout final approach.

To simulate an engine out glide with the LG down, use IDLE and 20 degrees speedbrakes.

Keep airspeed high enough (above 170 knots) to land or to zoom and eject if engine failure occurs. If the engine fails, close speedbrakes and jettison stores. Use speedbrakes as required to control airspeed and touchdown point.

After landing, NO deploy the drag chute if desired, open speedbrakes fully and extend the hook if required. If the engine rpm is greater than normal with the throttle in IDLE or some other malfunction requires excessive braking action to maintain a safe taxi speed, the brakes may absorb a high amount of energy in a short period of time. If required, refer to HOT BRAKES, this section.

CONTROLLABILITY CHECK

During any in-flight or landing emergency when structural damage or any other failure that may adversely affect aircraft handling characteristics is

known or suspected, a controllability check should be performed. The following items should be accomplished:

1. Attain safe altitude.
2. GW – Reduce (As required).
3. Determine optimum configuration available for landing.
4. Slow only to that AOA/speed which allows acceptable handling qualities.

CABLE ARRESTMENT

If there is any doubt about stopping on the remaining runway, lower the hook. Engage the cable as close to center as possible, nosewheel on the runway with brakes off and aligned with the runway. Place the HOOK switch to DN at least 1000 feet before reaching the arresting cable and reduce speed as much as possible; however, if brakes and NWS are inoperative, use flaperons and rudder as required to maintain directional control. As the aircraft slows to below 70 knots, directional control is reduced and the aircraft will drift right.

For an approach-end arrestment, touchdown should be at least 500 feet in front of the cable to allow sufficient time to lower the nosewheel to the runway prior to engagement. Immediately after touchdown, retard throttle to IDLE. Refer to figure 5-6 for hook engagement limits.

The recommended procedure for all arrestments is to engage the cable with all LG on the runway. After engagement, cable rollback should be controlled by the throttle. For cable disengagement, approximately 10-15 percent increase in rpm will be required to allow a rollback disengagement.

WARNING

Cable arrestment at speeds greater than emergency arrestment speed, off-center distances greater than 35 feet, or with the nosewheel in the air could result in structural failure of the NLG, hook, and/or hook backup structure.

NOTE

- Under certain conditions, arrestment may produce a bouncing motion which is readily apparent.
- Offcenter engagement will result in aircraft yaw motions during cable runout.

1. GW – Reduce (As required).
2. HOOK switch – DN.

   Approach-end arrestment: Touchdown at least 500 feet in front of the cable.

   Departure-end arrestment: HOOK switch to DN at least 1000 feet before reaching the cable.
3. SHOULDER HARNESS knob – LOCKED.

Prior to cable engagement:

4. Throttle – IDLE.
5. NWS – Engage (If required).
6. Engage cable as close to center as possible; nosewheel on the runway and brakes off.

CAUTION

Do not use brakes while the cable is stretched or while being pulled backward. This action can result in aircraft tipping backward. Control rollback with the throttle.

LG EXTENSION MALFUNCTIONS

Malfunctions in extending the LG are normally indicated by failure of the LG handle to lower or by failure of one or more LG to extend accompanied by lack of the corresponding WHEELS down lights and continuous illumination of the LG handle warning light. Refer to LG FAILS TO EXTEND, this section.

There are also a variety of possible electrical related malfunctions that produce abnormal indications when the LG handle is lowered. These indications may include failure of the LG handle warning light to illuminate during LG transit or lack of any lights after the LG handle is lowered. The malfunction may be an indication problem or may be a failure of one or more LG to extend. A visual confirmation of the LG position should be obtained if possible. These electrical-related failures can also make the brakes, hook, NWS, and NO drag chute inoperative as well as affect speedbrake limiting and nozzle opening. Malfunctions can be caused by various electrical shorts, component failures, or cannon plug problems.

Because of the number of possible malfunctions and the difference in wiring between [A], [B], and different blocks of aircraft, specific procedures to handle every situation are not feasible. If time and conditions permit, ground supervisory and technical assistance should be requested. Evaluate available options prior to alternately extending the LG. Other options may include an LG up landing, diverting to a more suitable landing field, landing where the hazards of departing the prepared surface are minimal, or using a cable arrestment.

An indication failure (LG actually down and locked but one or more WHEELS down lights not illuminated) may be distinguished from an actual extension malfunction by the LG handle warning light. The WHEELS down lights and the LG handle warning light have separate power sources and circuitry. Thus, if the LG handle warning light comes on while the LG is in transit, then goes off, the LG should be down and locked even though the WHEELS down lights indicate a problem. If the LG handle warning light does not illuminate during LG transit, the LG may not be down and locked even though the warning light tests good with the MAL & IND LTS test button. If possible, cycle the LG once to reattempt extension while watching the LG handle warning light.

In some cases, the ANTI-SKID caution light may give an indication of probable braking, hook, NWS, and [NO] drag chute operation since it uses the same power source and circuitry. If the ANTI-SKID caution light illuminates with the ANTI-SKID switch in OFF, power should be available for braking. (This check can be accomplished in either CHAN 1 or 2 with the LG handle in DN, or in CHAN 2 only with the LG handle in UP.) If the ANTI-SKID caution light does not illuminate, then braking, hook, NWS, and [NO] drag chute operation may not be available.

LG Fails To Extend

If the LG handle cannot be moved to the DN position after depressing the down permission button, the electrical circuitry or solenoid has probably failed. [A] [BF] The DN LOCK REL button mechanically permits the LG handle to be moved to the DN position. If the LG handle cannot be moved to the DN position due to a mechanical failure, CHAN 1 brakes are inoperative, TEF's must be extended using the ALT FLAPS switch, and the nozzle will remain closed. With the nozzle closed, idle thrust will be approximately 400 pounds greater than normal. If no WHEELS down lights are on or if no LG extends, check for dc bus No. 1 or No. 2 failure. Refer to EMERGENCY POWER DISTRIBUTION, this section.

If one or more LG fails to extend, the LG handle may be cycled once to reattempt extension. However, if the LG has previously failed to retract, do not cycle the LG handle; damage to the LG or LG doors may preclude successful extension. If any LG does not extend, the alternate extension system must be used.

If possible, get a visual confirmation of LG position. If only the NLG WHEELS down light is off, confirmation of the NLG position can be made by checking landing/taxi light operation. Illumination of either light confirms that the NLG is down and locked. With the NLG WHEELS down light off, NWS may be inoperative. Consider go-around capability after any extension malfunction in the event the brakes are found to be inoperative after touchdown.

If LG handle cannot be lowered normally:

1. DN LOCK REL button – Depress and lower LG handle.

If LG handle still cannot be lowered:

2. ALT FLAPS switch – EXTEND
3. BRAKES CHAN switch – CHAN 2
4. Go to ALTERNATE LG EXTENSION, this section.
   Nozzle will remain closed resulting in higher than normal landing thrust.

If LG handle lowers and one or more LG indicate unsafe:

WARNING

If no WHEELS down lights are on or no LG extends, check for a failed dc bus No. 1 or No. 2 (refer to EMERGENCY POWER DISTRIBUTION, this section). If a dc bus failure is not indicated, verify ANTI-SKID caution light operation by cycling the ANTI-SKID switch. If the ANTI-SKID caution light does not illuminate, brakes, hook, NWS, and [NO] drag chute operation may not be available. Evaluate available options (e.g., LG up landing, diverting to a more suitable landing field, or using a cable arrestment) prior to alternately extending the LG.

CAUTION

If the LG previously failed to retract, do not cycle the LG handle. Damage to the LG or LG doors may preclude successful extension.

1. LG handle – Cycle.

If LG still indicates unsafe:

2. Go to ALTERNATE LG EXTENSION, this section.

Alternate LG Extension

Alternate LG extension should be accomplished at the lowest practical airspeed below 190 knots. The NLG may not indicate down and locked until airspeed is reduced below 190 knots. NWS will be inoperative after alternate LG extension even if system B hydraulic pressure is available.

1. LG handle – DN (Use DN LOCK REL, if required).

2. Airspeed – 190 knots maximum (If practical).
   LG can be alternately extended up to 300 knots; however, the NLG may not fully extend until 190 knots. Time above 190 knots should be minimized in case there is a leak in the pneumatic lines.

3. ALT GEAR handle – Pull.

CAUTION

Do not depress the ALT GEAR reset button while pulling the ALT GEAR handle. This action may preclude successful LG extension.

If LG indicates safe:

If possible, get visual confirmation of LG position.

4. Stop straight ahead on the runway.
   Consider go-around capability in the event the brakes are found to be inoperative after touchdown.

CAUTION

- NWS is not available following alternate LG extension.
- If the LG was alternately extended due to failure of system B, only accumulator braking is available and after stopping, the parking brake should be set until chocks are installed.

If LG indicates unsafe:

4. Apply g force to free LG.
   Up to 300 knots may be required to provide sufficient g force.

If LG still indicates unsafe:

5. Go to LG UP LANDING, this section.

LG Up Landing

Prior to landing with any of the LG up, consider the following:

- Airfield facilities.
- Hook engagement limits.
- Crosswind component.
- Runway and overrun conditions.

If conditions are not favorable:

1. Refer to EJECTION (TIME PERMITTING), this section.

To accomplish an LG up landing:

1. Retain empty fuel tanks and racks.

WARNING

If time permits, delay landing until external tanks are empty. If an immediate landing is required, jettison all external tanks.

2. Armament – Jettison.

3. GW – Reduce.

4. TANK INERTING switch – TANK INERTING.

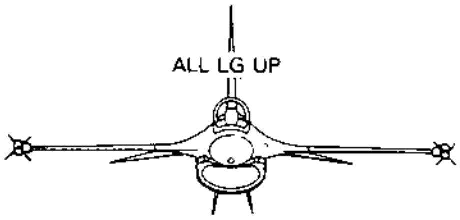
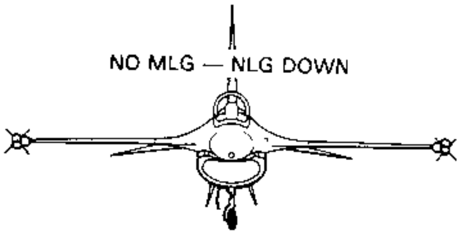
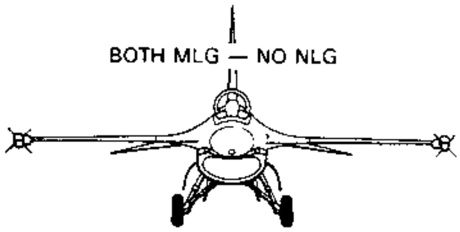
5. AIR REFUEL switch – OPEN.

NOTE

Delay placing the AIR REFUEL switch to OPEN until all external tanks are empty.

6. Refer to figure 3-12.

LG Up Landing

<table>
<tr><th rowspan="2">CONFIGURATION</th><th colspan="2">APPROACH-END ARRESTMENT</th></tr>
<tr><th>AVAILABLE</th><th>UNAVAILABLE</th></tr>
<tr><td>ALL LG UP
</td><td>ARRESTMENT NOT RECOMMENDED. USE APPROACH-END ARRESTMENT UNAVAILABLE PROCEDURE.</td><td>7. EPU – ON.
8. ALT FLAPS – EXTEND.
9. LOW ANGLE APPROACH AT 13° AOA.
10. THROTTLE – OFF IMMEDIATELY PRIOR TO TOUCHDOWN.</td></tr>
<tr><td>NO MLG — NLG DOWN
</td><td>7. LEAVE NLG DOWN.
8. HOOK – DOWN.
9. EPU – ON.
10. LOW ANGLE APPROACH AT 13° AOA.
11. ATTEMPT A FLY-IN ENGAGEMENT.
12. THROTTLE – OFF IMMEDIATELY PRIOR TO TOUCHDOWN.</td><td>7. EPU – ON.
8. LEAVE NLG DOWN.
9. LOW ANGLE APPROACH AT 13° AOA.
10. THROTTLE – OFF IMMEDIATELY PRIOR TO TOUCHDOWN.</td></tr>
<tr><td>BOTH MLG — NO NLG
</td><td>ARRESTMENT NOT RECOMMENDED. USE APPROACH-END ARRESTMENT UNAVAILABLE PROCEDURE.</td><td>7. EPU – ON.
8. LOW ANGLE APPROACH AT 13° AOA.
9. THROTTLE – OFF AFTER TOUCHDOWN.
10. LOWER NOSE TO RUNWAY BEFORE CONTROL EFFECTIVENESS BEGINS TO DECAY.
11. EPU – OFF AFTER STOP.</td></tr>
<tr><td rowspan="2">ONE MLG — NO NLG
</td><td>ARRESTMENT NOT RECOMMENDED. USE APPROACH-END ARRESTMENT UNAVAILABLE PROCEDURE.</td><td rowspan="3">7. ALT GEAR HANDLE – IN.
8. WAIT 5 SECONDS.
9. ALT GEAR RESET BUTTON – DEPRESS (2 SECONDS).
10. LG HANDLE – UP.
11. USE ALL LG UP PROCEDURE.
12. IF LG WILL NOT RETRACT, RECOMMEND EJECTION.</td></tr>
<tr><td rowspan="2">7. HOOK – DOWN.
8. EPU – ON.
9. LOW ANGLE APPROACH AT 13° AOA.
10. AFTER TOUCHDOWN, USE ROLL CONTROL TO HOLD WING UP DURING ENGAGEMENT.
11. THROTTLE – OFF AFTER ENGAGEMENT.

WARNING

IF THE ENGAGEMENT IS MISSED, MAINTAIN WINGS LEVEL AND GO-AROUND. IF A GO-AROUND IS NOT ACCOMPLISHED, THE AIRCRAFT MAY GROUND LOOP.</td></tr>
<tr><td>ONE MLG — NLG DOWN
</td></tr>
</table>

Figure 3-12.

ASYMMETRIC STORES (LANDING)

A modified approach is required if the net asymmetry exceeds 10,000 foot-pounds. (Refer to figure 3-13 for computation of asymmetric moment.) If the net asymmetry exceeds 22,650 foot-pounds, stores should be selectively jettisoned from the heavy wing to reduce the asymmetry to less than 22,650 foot-pounds. In either case, controllability should be checked with the LG down to determine handling qualities and the feasibility of landing. Avoid abrupt control inputs. Limit maximum bank angle changes to 90 degrees and do not exceed 10 degrees AOA until the net asymmetry can be determined. If landing is feasible, plan to fly a straight-in approach at 10 degrees AOA maximum. Use roll trim and lateral stick as required. Full roll trim may not be enough to compensate for large asymmetries. Avoid using rudder and do not use rudder trim. Accept untrimmed flight and a wings-level crabbed approach through touchdown. Required roll inputs will also lead to ARI inputs. When the ARI switches out with wheel spin-up, large rudder changes can occur which cause yaw into the heavy wing. When landing with no crosswind, this yaw helps align the aircraft with the runway. With crosswind components greater than 10 knots, land with the heavy wing into the crosswind even if this entails landing downwind. Failure to do so may result in inadequate roll control.

1. Compare weights on mirror stations (4 and 6, 3 and 7, etc.).

2. Determine asymmetric moment (figure 3-13) for each set of stations. Enter with weight difference at bottom of chart, project vertically to the appropriate line, and project horizontally left to read the assymmetric moment.

3. Add or subtract each asymmetric moment to determine net asymmetry.

Asymmetric Moment

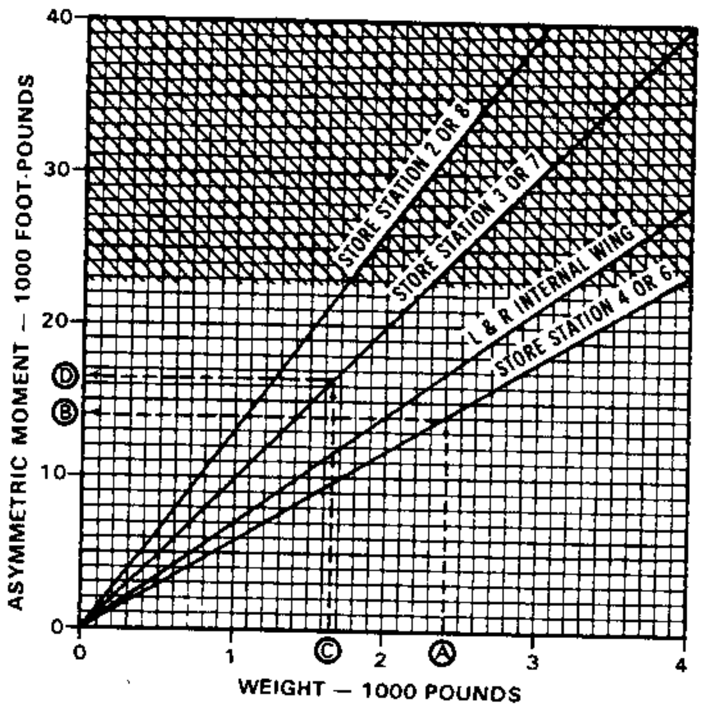


Figure 3-13.

1F-16X-1-0629

Sample Problem 1:

- Full 370-gallon tank on station 4; empty tank on station 6.
- Three MK82 (SNAKEYE) bombs on station 3; station 7 empty.

A. Station 4/6 weight difference = 2405 lb

B. Asymmetric moment = 14,000 foot-pounds

C. Station 3/7 weight difference = 1650 lb

D. Asymmetric moment = 16,500 foot-pounds

E. Net asymmetry (B+D) = 30,500 foot-pounds

Sample Problem 2:

- Full 370-gallon tank on station 6; empty tank on station 4.
- Three MK82 (SNAKEYE) bombs on station 3; station 7 empty.

Follow same procedures (A thru D) as above; however, since the asymmetric moments are on the opposite wing, the moments are subtracted rather than added.

E. Net asymmetry (B–D) = 2500 foot-pounds

1. AOA – 10 degrees maximum.

WARNING

Asymmetric loads in excess of 22,650 foot-pounds severely limit lateral control when rolling away from the heavy wing. Until determining net asymmetry, limit maximum bank angle change to 90 degrees, avoid abrupt control inputs, and do not exceed 10 degrees AOA.

2. Determine net asymmetry.
   Refer to figure 3-13.

If asymmetry is less than 10,000 foot-pounds:

3. Land normally.

If asymmetry is greater than 10,000 foot-pounds:

3. Stores – Jettison (as required).
   Jettison stores as required from the heavy wing to obtain a net asymmetry less than 22,650 foot-pounds.
4. Controllability – Check.
   Lower LG at a safe altitude and check handling qualities up to 10 degrees AOA maximum.

If landing is feasible:

WARNING

The decision to land with asymmetry greater than 22,600 foot-pounds should consider such factors as weather conditions, runway length and surface conditions (RCR), arresting gear availability, and crosswind component/gusts.

5. Fly straight-in approach at 10 degrees AOA maximum.

CAUTION

Use care to avoid exceeding 10 degrees AOA in the flare.

6. Do not trim rudder.
   ARI cutout occurs at touchdown. Use roll trim and lateral stick as required and accept untrimmed flight.

If landing is not feasible:

7. Go to EJECTION (TIME PERMITTING), this section.

LANDING WITH ACTIVATED EPU

Inform landing base of EPU operation, request bioenvironmental services support, and park in isolated controlled area. Selection of OXYGEN 100% before landing and after touchdown with ECS off is recommended.

WARNING

Treat any leak as a hydrazine leak until investigation proves otherwise.

CAUTION

If AIR SOURCE knob is placed to OFF or RAM, also turn off nonessential avionic equipment as electronic equipment may be damaged.

After the aircraft is parked, turn the EPU off, shut down the engine, and insure that the EPU ground safety pin is installed.

NLG WOW SWITCH FAILURE

If the NLG WOW switch fails to the ground position, the A/R DISC function on the stick will be inoperative, the speedbrakes will not be limited to 43 degrees with the LG down, NWS can be engaged in flight, and probe heat will not automatically be available to the fuselage-mounted air data probes.

1. NWS – Engage.

If NWS engage light comes on:

2. PROBE HEAT switch – Check PROBE HEAT.
3. NWS – Disengage.
4. NWS engage light – Off.

NOTE

Make sure that NWS engage light is off prior to landing so that the NWS will not follow rudder commands when the NLG is lowered to the runway.

5. Speedbrakes – Close to less than 40 degrees.

CAUTION

Normal pitch angle at touchdown with fully opened speedbrakes will bring the speedbrakes in contact with the runway.

SECTION IV

CREW DUTIES

(Not Applicable)

SECTION V

OPERATING LIMITATIONS

TABLE OF CONTENTS

INTRODUCTION

The aircraft and system limitations that must be observed during normal operations are presented in this section. Those limitations that are characteristic of a special phase of operations such as emergency procedures, etc., are not covered in this section.

INSTRUMENT MARKINGS

Refer to figure 5-1 for location and range of the markings.

ENGINE LIMITATIONS

Refer to figures 5-1 through 5-4 for engine limitations.

PRIMARY FUEL

JP-4/NATO F-40 is the primary fuel. However, NATO F-40 may not contain corrosion inhibitor at some locations. Restrict engine operation without corrosion inhibitor to 10 consecutive hours.

ALTERNATE FUEL

JP-5; JP-8; NATO F-34, F-35, F-43, and F-44; or commercial JET A-1 and JET B are alternate fuels. Except for freeze point and possible icing and corrosion inhibitor differences, JET B and JP-4 are equivalent and the same operating limitations apply.

Operating and throttle movement limitations for alternate fuels are the same as for primary fuels except: Ground starts with temperature below –4°F (–20°C) with alternate fuel may produce more smoke and require a longer time for engine light-off. Ground starts should not be attempted with fuel temperature below –40°F (–40°C). Airstart light-off times also may be slightly longer.

Alternate fuels with very high flash points, JP-5, NATO F-43, NATO F-44, may leave visible signature on AB cancellation at high altitude.

Alternate fuels may be intermixed in any proportion with primary fuels during ground or AR operations. No change in engine operating limitations or retrim is required. Alternate fuels are heavier; refer to FUEL QUANTITY INDICATION AND TANK ARRANGEMENT, Section I.

Due to alternate fuel freeze points, fuel in external tanks may not transfer after sustained operation (5 minutes or longer) below 200 knots above 25,000 feet or 250 knots above 45,000 feet.

NATO F-34 and NATO F-44 may not contain corrosion inhibitor and NATO F-35, NATO F-43, JET A-1, and JET B may not contain icing or corrosion inhibitors. Restrict operation without icing inhibitor to one flight. Restrict engine operation without corrosion inhibitor to 10 consecutive hours.

SYSTEM RESTRICTIONS

JFS LIMITS

Refer to figure 5-5.

IDENTIFICATION LIGHT DE A

LESS 41 To prevent heat damage to the lens, continuous use of the ID light is limited to 5 minutes in flight.

TIRE SPEED LIMIT

The MLG tire is marked 200 knots; however, the tire is certified for use to 217 knots groundspeed.

BRAKE ENERGY LIMITS

Brake energy limits for maximum effort braking, taxi, aborted takeoff, landing, and the effect on turnaround capability are presented in Appendix 1, Part 2. The actual energy per brake may differ considerably from the value found in figures A2-15 and A2-16. This is caused by eventual unequal energy distribution between the brakes, residual heat energy from previous braking, or time delay between maximum brake application and three-point aerodynamic braking. Maximum brake application speed is the maximum speed from which the aircraft can be stopped using maximum braking. This speed is based on each brake's capability to absorb a maximum of 18.2 million foot-pounds of energy. (Refer to ABORTED TAKEOFF MAXIMUM BRAKE APPLICATION SPEED, Appendix 1, Part 2.)

CAUTION

- Initiating maximum effort braking above maximum brake application speed may result in loss of braking before the aircraft is stopped.
- Danger zone procedures should be followed for any event which requires excessive braking.
- If brake energy absorption is in the danger zone, wheel fusible plugs will release tire pressure within 3-15 minutes after the stop.

FUEL SYSTEM LIMITATIONS

One Reservoir Empty

The maximum allowable fuel flow with one reservoir empty is 25,000 pph.

Negative G Flight

NOTE

Negative g flight should be avoided when a low fuel condition exists (forward or aft reservoir not full) or ENG FEED knob out of NORM.

AIRSPEED LIMITATIONS

SYSTEM AIRSPEED LIMITATIONS

Refer to figures 5-6 and 5-7.

NOTE

All references to airspeed quoted in knots refer to indicated airspeed.

LOW AIRSPEED OPERATING LIMITATIONS LESS 37

37 Recovery should be initiated no later than activation of the low speed warning tone.

LESS 37 To avoid departures, recovery from pitch attitudes greater than 60 degrees should be initiated no lower than 225 knots (175 knots after accomplishing fuel balancing).

To avoid departures due to roll coupling, do not operate with category III loadings below 200 knots (except for takeoff and landing).

WARNING

- Departures from controlled flight with asymmetric category III loadings may result in fast, flat (possibly nonrecoverable) spins.
- Departures may occur during wing rock maneuvers initiated below 350 knots without the usual physical cues (increasing stick forces or increasing buffet).

LOW AIRSPEED OPERATING LIMITATIONS 47

Departures with category I loadings can be avoided if recovery from climbs at greater than 45 degrees pitch attitude is initiated no later than activation of the low speed warning tone.

To avoid departures due to roll coupling, do not operate with category III loadings below 200 knots except for takeoff and landing.

WARNING

Departures from controlled flight with asymmetric category III loadings may result in fast, flat (possibly nonrecoverable) spins.

AOA AND ROLLING LIMITATIONS

Refer to figure 5-9. With heavy wing loadings, it may be necessary to cancel the roll command up to 90 degrees early to avoid exceeding the maximum bank angle limit.

An asymmetric loading is any asymmetry that requires lateral and/or directional trim. Refer to ASYMMETRIC LOADINGS, Section VI.

Nose slice and yaw departure may occur during maximum command rolls on the CAT I AOA limiter at high altitude when carrying a centerline tank. Refer to YAW DEPARTURE, Section VI.

WARNING

- If the aircraft CG is near the aft limit, departure may occur while performing low airspeed, high AOA, maximum command rolling maneuvers with either of the following:
  - Asymmetric category I missile loadings (station 2, 3, 7, or 8).
  - Speedbrakes opened.
- 47 The indicated bank angle change limit is particularly critical for category I loadings with 370-gallon fuel tanks plus suspension equipment on stations 3 and 7. Care is required with these loadings to check the roll so as not to exceed the indicated bank angle change limit.

PROHIBITED MANEUVERS

The following maneuvers are prohibited:

1. LESS 47 Intentional departures and spins.
2. 47 Intentional departures and spins with any of the following:
   - Symmetric category I loading with suspension equipment or missiles at station 3, 4, 6, or 7.
   - Asymmetric category I loading.
   - Category III loading.
   - Altitude below 30,000 feet AGL.
   - Forward/aft fuel distribution [A] less than 250 pounds forward heavy or [B] greater than 950 pounds aft heavy.
   - Lateral fuel (internal and external) imbalance greater than 200 pounds.
3. Repeated maximum rudder reversals.
4. Consecutive 360-degree maximum command rolls.
5. With the STORES CONFIG switch in CAT I, maximum command rolling maneuvers above 600 knots and below 20,000 feet MSL are limited to 90 degrees of bank angle change. Above 750 knots, maximum command rolls are prohibited.
6. Maximum command rolling maneuvers above 1.8 mach and either above 3g or below 35,000 feet MSL.
7. Rudder rolls or rudder-assisted rolls of more than 90 degrees of bank angle change with any store on station 3, 4, 6, or 7.
8. With LG and/or TEF's down:
   - Flight above 15 degrees AOA with stores at station 3, 4, 6, or 7.
   - Maximum command rolls of more than 90 degrees of bank angle change.

GROSS WEIGHT LIMITATIONS

The maximum allowable GW for all aircraft configurations is 35,400 pounds.

ACCELERATION LIMITATIONS

Refer to figures 5-8 and 5-10.

LESS 59 To avoid possible loss of main generator power, negative g flight is restricted to a maximum of –1g. This limit has priority over all other published –g limits (e.g., figure 5-10).

NOTE

- Due to dynamic overshoot during abrupt symmetrical maneuvers, the maximum g force displayed in the HUD may be as high as 9.5.
- [BR] Due to the location of the accelerometer, it should not be used to determine maximum g force.

Negative g flight is limited to a maximum of 10 seconds for all altitudes, thrust settings, and configurations.

CAUTION

Report an over-g if, during a symmetric maneuver, an encounter with wake turbulence produces a bank angle change greater than 90 degrees and a g level in excess of the asymmetric limit.

Do not exceed 4.5 asymmetric g's at speeds above 700 knots below 10,000 feet MSL. For all other flight conditions, observe asymmetric g limits in figures 5-8 and 5-10.

CG LIMITATIONS

LESS 47 Refer to Section II for FUEL MANAGEMENT and Section III if the proper fuel distribution is not established and/or maintained.

47 The aircraft is within CG limits if no red zone shows on the fuel gage and if the forward/aft fuel distribution is [A] greater than 250 pounds forward heavy or [B] less than 950 pounds aft heavy. No additional fuel management is required with automatic forward fuel transfer.

STORES LIMITATIONS

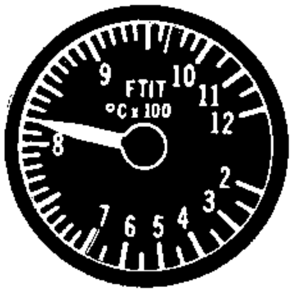
Authorized stores loading configurations and the related limitations are shown in figure 5-10.

MISCELLANEOUS LIMITATIONS

CROSSWIND LIMITS

The crosswind limits for takeoff and landing are shown in figure A2-14.

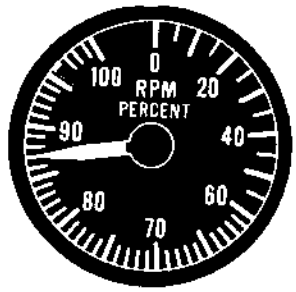
Instrument Markings



680°C GROUND ENGINE START

970°C MAXIMUM STEADY STATE

FTIT



96% MAXIMUM STEADY STATE

NOTE: RPM is limited to 94 percent on takeoff roll.

RPM

15 PSI MINIMUM

70 PSI MAXIMUM

OIL PRESSURE

3250 PSI MAXIMUM

2850-3250 PSI NORMAL

HYDRAULIC PRESSURE

1F-16A-1-0141

Figure 5-1.

Engine Limitations

GROUND

CONDITION	FTIT °C	RPM %	OIL PSI	REMARKS
START	680	–	100	During cold start, maximum oil pressure is 100 psi for 1 minute
IDLE	575	–	15 (min)	FTIT 750°C in BUC
MIL/AB	954	94	30-70	At MIL and above, oil pressure must increase 15 psi minimum above IDLE oil pressure
TRANSIENT	970	94	30-70	Maximum temperature limited to 30 seconds. In BUC, throttle movements must be slower than normal (5 seconds or longer from BUC IDLE to MIL or MIL to BUC IDLE)
FLUCTUATION	±10	±1	±5 IDLE	Must remain within steady-state limits. In-phase fluctuations of more than one instrument or fluctuations accompanied by thrust surges indicate engine control problems. Nozzle fluctuations limited to ±2% at and above MIL. Fluctuations not permitted below MIL

IN FLIGHT

CONDITION	FTIT °C	RPM %	OIL PSI	REMARKS
AIRSTART	800	–	–	–
IDLE	–	–	15 (min)	–
MIL/AB	970	96	30-70	Oil pressure must increase as rpm increases. AB operation is prohibited in BUC
VMAX	990	96	30-70	Do not use Vmax except in actual combat. Use of Vmax limited to 6 minutes per application when over 957°C. Total of 60 minutes before turbine inspection/overhaul. All Vmax time must be logged on AFTO Form 781
TRANSIENT	990	96	30-70	Maximum temperature limited to 10 seconds. BUC operation same as ground operation
FLUCTUATION	±10	±1	±5 IDLE ±10 above IDLE	Same as ground operation. Zero oil pressure is allowable for periods up to 1 minute during flight at less than +1g

Figure 5-2.

Afterburner Operation and Light-Off Limits

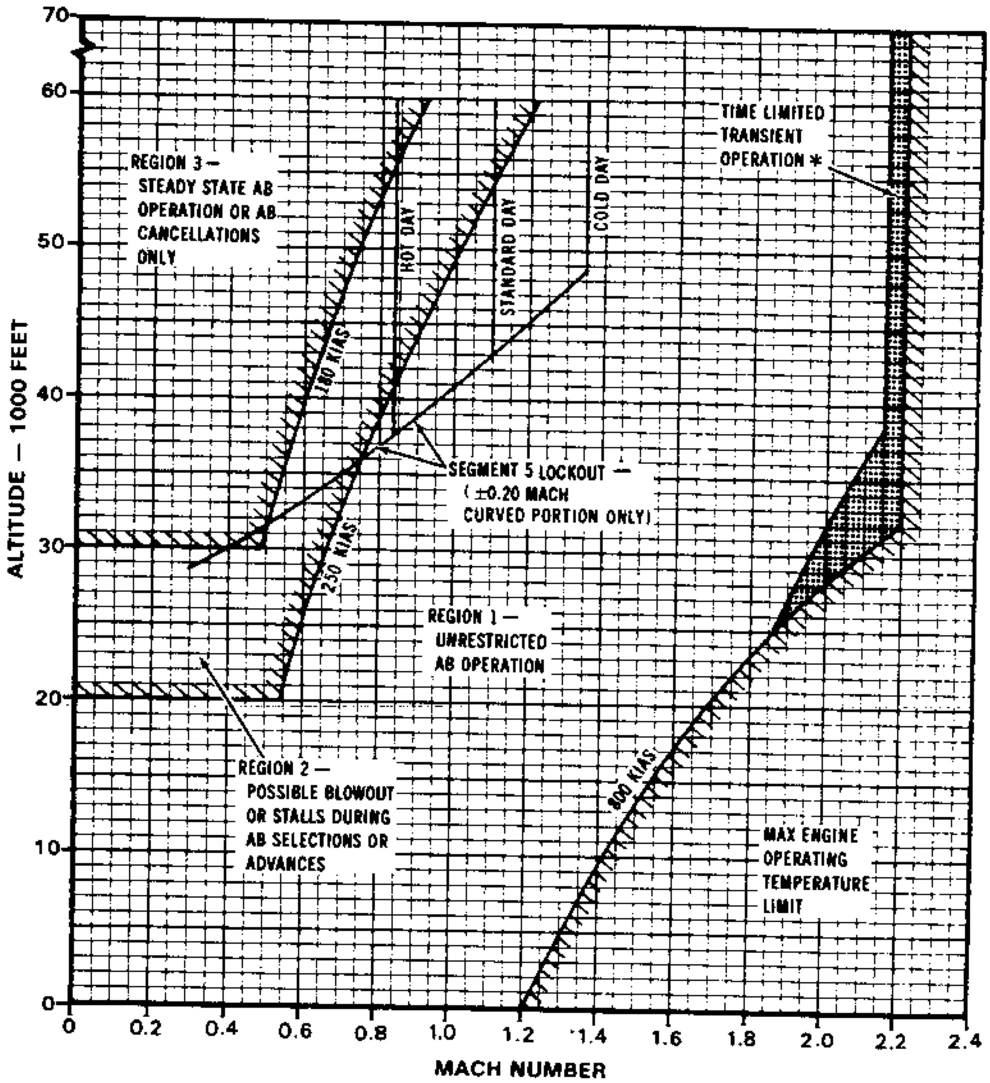
Region 1: Unrestricted AB operation. Mislights, blowouts, or stalls should not occur. Some AB rumble may occur in segment 5 just below the lockout line and may result in AB blowout or stalls. If a mislight, blowout, or self-clearing engine stall occurs coincident with AB operation in region 1, an engine problem associated with AB is probable. The engine is safe to operate for the rest of the flight in the IDLE to MIL range provided no other abnormal engine indications are observed.

Region 2: Most AB transients can be expected to be successful; however, AB mislights, light-off stalls, or rumble blowouts or stalls may occur during AB light-off during throttle transients within the AB range but should not occur during steady-state AB operation. If blowout or stall occurs, progressing to region 1 should permit a successful AB relight and therefore allow further transients of the AB in region 2. If a second mislight, blowout, or self-clearing stall occurs in region 2, further AB advances should be restricted to region 1, and the discrepancy should be noted in AFTO Form 781.

Region 3: Steady state AB operation or AB cancellations only in this region. AB mislights, light-off stalls, blowouts, and rumble-induced stalls are probable during transients from all throttle settings. AB rumble and blowout are possible during steady-state operation. If a mislight, blowout, or stall occurs, progressing to region 1 should permit a successful AB relight and normal use of AB.

CHANGE NOTE

THIS ILLUSTRATION EXTENSIVELY CHANGED



NOTES:

*1. Time Limited Transient Operation - Operation limited to 3 minutes.

2. Restrictions pertain to region where AB light-off occurs, not necessarily the region in which the throttle is advanced to AB.

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Figure 5-3.

BUC Operational Flight Envelope

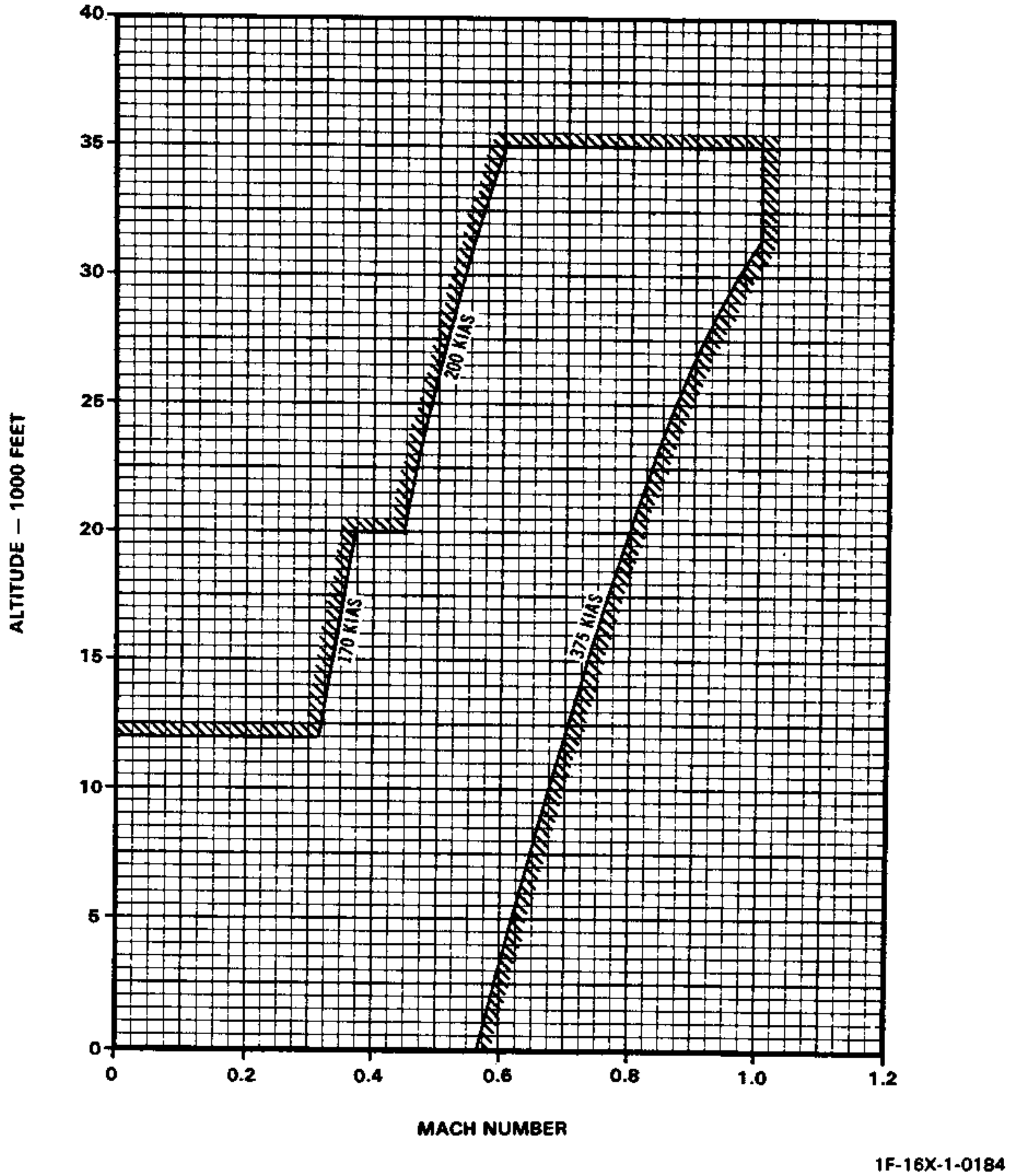


Figure 5-4.

Jet Fuel Starter Limits

CONDITION	LIMITS
Normal Ground Operation	* Continuous or consecutive motoring runs shall not exceed 4 minutes total time and may be followed by a normal engine start. After a total of 4 minutes motoring time is accumulated, the JFS must be shut down and the ADG allowed to cool for 80 minutes before additional motoring of up to 4 minutes can be accomplished. A minimum wait of 1 minute is required after each JFS start attempt to allow fuel drainage from the JFS.
Hot Start of Engine	Motor until FTIT is below 200°C.
Airstart/In Flight	Below 20,000 feet MSL and 400 knots. 3-minute maximum run time when the engine is operating satisfactorily above 60 percent rpm; otherwise, unlimited.

* Motoring is defined as JFS rotating engine at approximately 25 percent rpm with the throttle in OFF.

NOTES:

- OAT between 20°F (–6°C) and 100°F (38°C) use START 1. A minimum hydraulic accumulator pressure of 3000 psi is required.
- OAT between –25°F (–32°C) and 20°F (–6°C) or OAT above 100°F (38°C) use START 2. A minimum hydraulic accumulator pressure of 2800 psi is required.
- OAT below –25°F (–32°C) use START 2. A minimum hydraulic accumulator pressure of 3200 psi is required.
- If one hydraulic accumulator is depleted, use START 2. Verify a minimum charge of 3000 psi in the remaining accumulator before attempting START 2.

Figure 5-5.

Hook Engagement Limits

ARRESTMENT LIMITATIONS FOR BAK-6/9/12/13/14

ROUTINE ARRESTMENT	135 KNOTS
EMERGENCY ARRESTMENT	150 KNOTS

Arrestment should always be accomplished at the lowest speed and GW possible. The cable should be engaged on center with the NLG on the ground.

NOTE

Attempting to engage an unmodified (non-hook capable) MA-1A will most likely be unsuccessful.

Figure 5-6.

Airspeed Limitations (Systems)

SYSTEM OR CONDITION	KIAS/MACH
Canopy Open	70 (Includes ground wind velocity)
LG Extended LG Door Down	300/0.65, whichever is less
TEF's Operated With ALT FLAPS Switch AR Door Open	400/0.85, whichever is less
Flight in Severe Turbulence (+3g)	500
NO Drag Chute Deployment	170

Figure 5-7.

Acceleration Limitations

CONFIGURATION	LOAD FACTOR (g)	
	SYMMETRIC	ASYMMETRIC
TAKEOFF	+4.0, 0.0	+2.0, 0.0
LANDING	+4.0, 0.0	+2.0, 0.0
LG RETRACTION	+2.0, 0.0	+2.0, 0.0
LG EXTENSION	+2.0, 0.0	+2.0, 0.0

Figure 5-8.

AOA and Rolling Limits

AIRCRAFT	LOADING CATEGORY	STORES CONFIG SWITCH	MAX AOA	MAX BANK ANGLE CHANGE FOR MAX ROLL MANEUVER
LESS 47	I	I	LIMITER	360°
	II	I	LIMITER	360° Below 15° AOA
			LIMITER	180° Above 15° AOA
		OR III	LIMITER	360°
	III	III	LIMITER	180°
47	I	I	LIMITER	360°
	III	III	LIMITER	360°

NOTES:

1. Determine loading category from the appropriate line in figure 5-10, Stores Limitations, and **LESS 47** in figure 2-4, Fuel Management.
2. The roll command should be released in sufficient time to avoid overshooting the indicated bank angle change limits.

Adjustments for lateral asymmetries:

1. Determine the net lateral asymmetry by adding the weights of all wing loaded stores (except wingtip missiles), suspension equipment, and internal/external fuel.
2. If the net lateral asymmetry exceeds 200 pounds, limit category I maneuvering to a max bank angle change of 180° when above 15° AOA.
3. If the net lateral asymmetry exceeds 400 pounds, place the STORES CONFIG switch to CAT III and limit max bank angle change to 180°.

Figure 5-9.

Stores Limitations

SYMBOLS AND ABBREVIATIONS:

- AIM-9 Missile
- Nonnuclear AIR-SURFACE Store
- TER-9/A (Empty)
- TER-9/A (Partially Loaded)
- TER-9/A (Slant-2 Takeoff)
- TER-9/A (Fully Loaded)
- T LAU-88/A (Empty)
- LAU-88/A (Partially Loaded)
- LAU-88/A (Fully Loaded)
- LAU-117/A (Empty)
- LAU-117/A (Fully Loaded)
- LAU-3/A, B/A, C/A, D/A, or LAU-5003/A
- SUU-20A/A, B/A
- PYLON (Empty)
- AIM-9 Launcher plus Adapter (Empty)
- ECM Pod
- 300 300-Gallon Fuel Tank
- 370 370-Gallon Fuel Tank
- Travel Pod
- A/C Basic Aircraft Limits
- NA Not Applicable
- OPT Optional
- Nuclear AIR-SURFACE Store
- CBL Aerial Tow Target – Cable Pod
- TGT Aerial Tow Target – Target Pod

Figure 5-10. (Sheet 1)

Stores Limitations

DEFINITIONS:

- Mirror Image — The exact opposite sequence of a given configuration. For example: Stores on station 4 are loaded on station 6, and stores on station 6 are loaded on station 4 and so on for the entire configuration. The exchange must be complete for all stations carrying stores. No substitutions authorized.
- Optional — The store/pod/rack where identified may be retained or deleted from the configuration loading without affecting the limitations for that configuration.
- Suspension Equipment — Weapon pylon, centerline pylon, ECM centerline adapter, AIM-9 launcher, and AIM-9 launcher plus adapter.
- Auxiliary Suspension Equipment — Suspension equipment which attaches to weapon pylon to provide multiple carriage capability (i.e., TER-9/A, LAU-88/A, LAU-117/A, and SUU-20A/A or B/A).
- Normal Downloadings — Configurations obtained by releasing/offloading stores in the normal sequence from existing authorized takeoff configurations. Normal downloadings are also authorized takeoff configurations.
- Employment or Selective Jettison of Weapon:
  - Limitations apply to store separation from suspension or auxiliary suspension equipment.
- Jettison
  - AUX SPNSN — Limitations for selective jettison of auxiliary suspension equipment from weapon pylons.
  - FUEL TANKS — Limitations for selective jettison of 300/370-gallon fuel tanks.
  - EMERGENCY — Limitations for emergency jettison of all jettisonable stores.

Figure 5-10. (Sheet 2)

Stores Limitations

GENERAL RULES (MISCELLANEOUS):

- Mirror image of all authorized store loadings (symmetrical or asymmetrical) is authorized unless specifically restricted.
- ECM pods, travel pod, AIM-9 missiles, and AIS (ACMI) pods are nonjettisonable.

GENERAL RULES (ECM):

- The following ECM pods are authorized: AN/ALQ-119-12, -14, -15, -17 and AN/ALQ-131.
  - AN/ALQ-119-12 and -15 are interchangeable.
  - AN/ALQ-119-14 and -17 are interchangeable.
  - AN/ALQ-131 Terminal Threat Deep Pod (with or without receiver processor D00111P or D00111) and AN/ALQ-131 Two-Band Shallow Pod (C00011P).
- The following ECM pod loadings are not authorized:
  - Wing carriage pairs of AN/ALQ-119-12/or -15 or combinations thereof.
  - Wing carriage combinations of AN/ALQ-119-12/or -15 with AN/ALQ-119-14/or -17 or AN/ALQ-131.
  - AN/ALQ-131 ECM pod on centerline pylon.

Figure 5-10. (Sheet 3)

Stores Limitations

GENERAL RULES (AIM-9):

- The term AIM-9 denotes all authorized AIM-9 series: AIM-9J/N/P/L/M, including Danish training missile.
- AIM-9 missiles may be mixed in any combination for all lines.
- The P-3 or P-4 AIS (ACMI) pod may be substituted for any AIM-9 missile in the AIR-AIR loadings. AIS (ACMI) pod carriage limits are 650 knots/1.6 mach, −2g to +8.5g symmetric maneuvers, and −1g to +5.5g roll maneuvers. The most restrictive limits apply.
- Normal launch sequence of AIM-9 missiles is from inboard to outboard. Only one step over per wing is authorized.
- Normal downloading of AIM-9 missiles is authorized for all lines. In some cases, flight limits change.
- AIR-SURFACE configurations (NONNUCLEAR):
  - AIM-9 missiles may be launched to the store carriage limits or to missile launching limits, whichever is more restrictive.
  - Empty AIM-9 launchers and adapters may be carried at stations 2 and 8.
- AIR-SURFACE configurations (NUCLEAR):
  - AIM-9 missiles may be launched to the store carriage limits or to missile launching limits or according to REMARKS, whichever is more restrictive.
  - Empty AIM-9 launchers and adapters may not be carried at stations 2 and 8.

Figure 5-10. (Sheet 4)

Stores Limitations

GENERAL RULES (EMPLOYMENT OR JETTISON):

- Employment or selective jettison (MAX ACCEL G) limits are for zero roll rate.
  - Additional MAX ACCEL G limits, 0.5 to 4.0, apply to AIM-9 missile AIR-AIR loadings for HIGH ROLL RATE where the ROLL RATE is more than 100 degrees/second.
- Employment or jettison of all stores (except AIM-9 missiles or as specifically noted) must be at zero sideslip, at zero roll rate, at zero (±5 degrees) bank angle, and at AOA less than 10 degrees.
- Selective jettison of Auxiliary Suspension Equipment and Emergency Jettison must be at 1 (±0.2)g.
- AIR-SURFACE stores of the same type must be separated outboard to inboard.
- AIR-SURFACE stores in mixed loads may be separated inboard to outboard; however, all stores of one type must be employed before other store type is employed.
- Stores may be employed with any 300/370-gallon tank fuel quantity.

GENERAL RULES (ASYMMETRIC LOADINGS/FUEL):

- Asymmetric loadings/fuel may require more restrictive AOA and rolling limits (figure 5-9).
- The maximum permissible asymmetric loading is limited to a net asymmetric (rolling) moment of 22,650 foot-pounds. Refer to Section III for computation of net asymmetric moment. The 370-gallon fuel tanks must be carried symmetrically except where otherwise authorized.
- The 300/370-gallon fuel tank may be separated with any fuel quantity; however, when 300/370-gallon fuel tanks are carried simultaneously, the 300-gallon fuel tanks must be separated prior to 370-gallon fuel tank separation.
- The 300/370-gallon fuel tank selective or emergency jettison must be within a range of 0.7 to 2.0g.

Figure 5-10. (Sheet 5)

Stores Limitations

NOTES:

The following notes are referred to by circled numbers ((1)) throughout the stores limitation charts.

(1) MAX ACCEL G. If 300/370-gallon fuel tanks are installed, carriage acceleration limits apply with usable fuel in the tanks. Limits in ( ) apply when the 300/370-gallon fuel tanks are empty (contain only unusable fuel). Empty tank limits are shown only if different from limits with usable fuel.

(2) DRAG INDEX/CONFIGURATION WEIGHT is based on the following:

- DRAG INDEX includes all illustrated STATION LOADING stores, including optional stores, except AIM-9 missiles at stations 1 and 9 which are included in Basic Aircraft DRAG INDEX. Optional stores identified in General Rules or REMARKS must be added if loaded.
- CONFIG WEIGHT includes all illustrated STATION LOADING stores, including optional stores, except tip missile launchers which are included in Basic Aircraft Operating Weight. Optional stores identified in General Rules or REMARKS must be added if loaded.
- AN/ALQ-119-12 or -15 ECM pod, if loaded, except where a different ECM pod is specified. The AN/ALQ-131 ECM pod, where specified, is the Terminal Threat Deep Pod with receiver processor. ECM pod on centerline is loaded on the ECM centerline adapter. ECM pod(s) on the wing(s) is loaded on the weapon pylon.
- Full 300/370-gallon fuel tanks (JP-4), if loaded.

(3) REVERT TO LINE. Use the REVERT TO LINE to obtain new carriage limitations after the employment/jettison of all AIR-SURFACE stores.

(4) FUEL TANK — Selective jettison limits are for individual fuel tank jettison. The subsequent fuel tanks can be released when aircraft response is within basic fuel tank jettison limits. 51 Automatic selective dual 370-gallon fuel tank jettison is permitted.

Figure 5-10. (Sheet 6)

Stores Limitations

(5) If optional centerline store is not loaded or the centerline store has been released/jettisoned, reduce 370-gallon fuel tank selective jettison limits by 75 knots/0.1 mach.

(6) Lateral toss of stores is authorized at bank angles up to 90 degrees when normal employment acceleration g is from 1.0 to 4.0 and minimum airspeed is 350 KIAS with zero sideslip, zero roll rate, and AOA less than 10 degrees. Acceleration g at employment must be maintained until store(s) clears aircraft.

(7) Line 40.01.1 and BLOCK 15 with (51) **LESS** (74) line 40.01.2 — SMS considers this loading CAT I; disregard STORES CONFIG caution light.

(8) The jettison limit for the TER-9/A is 550 KIAS/0.9 mach when fully loaded or with lower weapon (only) released. With all other TER-9/A loadings, the jettison limit is 300 KIAS/0.7 mach.

(9) If 300/370-gallon fuel tanks have been jettisoned, the jettison limit is 550 KIAS/0.9 mach for fully loaded TER-9/A or with lower weapon (only) released. With all other TER-9/A loadings, the jettison limit is 300 KIAS/0.7 mach.

(10) LOADING CATEGORY. Category in [ ] applies to (47) and will be shown only if different from **LESS** (47) .

(11) **BLOCK 15 LESS** (51) The SMS considers anything other than missiles/launchers at station 3, 4, 6, or 7 to be a noncategory I loading. The STORES CONFIG caution light will be on with the STORES CONFIG switch correctly positioned for these category I loadings which include suspension equipment or 370-gallon fuel tanks at station 3, 4, 6, or 7. No corrective action is required.

Figure 5-10. (Sheet 7)

Stores Limitations – Temporary Restrictions

NOTES:

The following notes are referred to by circled numbers (1) throughout the stores limitations charts.

20 370-gallon tanks with and without clipped fins may be carried intermixed. Jettison limits are for 370-gallon fuel tanks with clipped fins. If 370-gallon tanks with unclipped fins are jettisoned (with or without ECM pod), the limit is 400 KIAS/0.65 mach and note 5 does not apply.

21 This configuration might exceed aircraft GW limitations. Refer to GROSS WEIGHT LIMITATIONS, this section.

Figure 5-10. (Sheet 8)

Stores Limitations

GROUP/STORE/LINE

- Store loadings are arranged in a GROUP (GP)/STORE/LINE system to maintain continuity and stability in numbering.
- All store loadings are listed by:
  - GROUP — Common use or function (70.XX.X).
  - STORE — Individual store or combination of stores (XX.02.X).
  - LINE — (XX.XX.1).
- GROUP titles and number designations are as follows:
  - MISSILE (AIR-AIR) .... 10.
  - REVERT TO LINE .... 20.
  - TRAINING .... 30.
  - FERRY CONFIGURATION .... 40.
  - DISPENSER .... 50.
  - MISSILE (AIR-GROUND)/ROCKETS .... 60.
  - BOMB .... 70.
  - GUIDED BOMB .... 80.
  - MIXED LOAD .... 90.
  - COUNTRY PECULIAR .... 400.
  - NUCLEAR .... 500.
- Example of store numbering for the first line of the BLU-52 bomb.

GROUP (BOMB)

STORE (BLU-52)

LINE

70.02.1

Figure 5-10. (Sheet 9)

Stores Limitations – Index

STORES	CONFIGURATION — SHEET NUMBER																																	
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	30.1	31	32	33	34	34.1	34.2	35	35.1	36	37	38	39	40	41	42	43	43.1
NONNUCLEAR																																		
AGM-65A,B																															●	●		
AIM-9 ⊠	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
AN/ALQ-119-15 8	●	●	●		●	●	●		●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●		●	●	●	●	●	●	●
AN/ALQ-119-17 8	●	●																				●	●											
AN/ALQ-131 8	●	●							●													●	●				●			●				
BDU-33B/B,D/B												●	●	●	●	●																		
BL-755 MK2																								●	●									
BLU-1C/B (UNFINNED)																																		
BLU-52																																		
BSU-49 (RT)																																		
BSU-49 (LD)																																		
BSU-50																																		
CBU-52/B																										●	●							
CBU-58/B,A/B																										●	●							
CBU-71/B,A/B																										●	●							
GBU-10/B,A/B																																		
GBU-12/B,A/B,B/B,C/B,D/B																																		
LAU-3/A,C/A,D/A ⊙																																	●	●
LAU-5003/A ⊙																																	●	●
M129E2																												●						
MC-1																																		
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	30.1	31	32	33	34	34.1	34.2	35	35.1	36	37	38	39	40	41	42	43	43.1

Figure 5-10. (Sheet 10)

Stores Limitations – Index

STORES	CONFIGURATION — SHEET NUMBER																																
	44	45	46	47	48	49	50	51	52	52.1	52.2	52.3	53	54	55	56	57	57.1	57.2	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
NONNUCLEAR																																		
AGM-65A,B																																		
AIM-9	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							
AN/ALQ-119-15	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●	●		●		●							
AN/ALQ-119-17									●																	●								
AN/ALQ-131									●																	●								
BDU-33B/B,D/B																																		
BL-755 MK2																																		
BLU-1C/B (UNFINNED)	●																																	
BLU-52		●													●																			
BSU-49 (RT)										●	●																							
BSU-49 (LD)											●																							
BSU-50												●							●															
CBU-52/B																●	●																	
CBU-58/B,A/B																●	●	●	●															
CBU-71/B,A/B																●	●																	
GBU-10/B,A/B														●																				
GBU-12/B,A/B,B/B,C/B,D/B													●																					
LAU-3/A,C/A,D/A																																		
LAU-5003/A																																		
M129E2																																		
MC-1	●																																	
	44	45	46	47	48	49	50	51	52	52.1	52.2	52.3	53	54	55	56	57	57.1	57.2	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72

Figure 5-10. (Sheet 11)

Stores Limitations – Index

STORES	CONFIGURATION — SHEET NUMBER																																	
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	30.1	31	32	33	34	34.1	34.2	35	35.1	36	37	38	39	40	41	42	43	43.1
NONNUCLEAR																																		
MK20 MOD 3,4,6																													●	●				
MK36 DESTRUCTOR																																		
MK82 (GENERAL PURPOSE)																																		
MK82 SNAKEYE (RT)																																		
MK82 SNAKEYE (LD)																																		
MK84																																		
MK106														●	●	●																		
MXU-648/A (TRAVEL POD) ⊖																		●	●	●	●	●												
2.75" FFAR														●	●	●																	●	●
CRV7																																	●	●
300/370 GAL TANK (300) (370)	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SECAPEM-90B BE (CBL) (TGF)																																		
TGM-65																	●																	
NUCLEAR																																		
B57 ●																																		
BDU-38 OR B61 ●																																		
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	30.1	31	32	33	34	34.1	34.2	35	35.1	36	37	38	39	40	41	42	43	43.1

Figure 5-10. (Sheet 12)

Stores Limitations – Index

STORES	CONFIGURATION — SHEET NUMBER																																	
	44	45	46	47	48	49	50	51	52	52.1	52.2	52.3	53	54	55	56	57	57.1	57.2	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
NONNUCLEAR																																		
MK20 MOD 3,4,6																																		
MK36 DESTRUCTOR						●	●																											
MK82 (GENERAL PURPOSE)				●	●											●																		
MK82 SNAKEYE (RT)						●	●								●																			
MK82 SNAKEYE (LD)								●							●																			
MK84									●								●	●																
MK106																																		
MXU-648/A (TRAVEL POD) ⊖																																		
2.75" FFAR																																		
CRV7																																		
300/370 GAL TANK (300) (370)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							
SECAPEM-90B BE (CBL) (TGT)																				●	●													
TGM-65																																		
NUCLEAR																																		
B57 ●																						●	●	●										
BDU-38 OR B61 ●																									●	●	●							
	44	45	46	47	48	49	50	51	52	52.1	52.2	52.3	53	54	55	56	57	57.1	57.2	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72

Figure 5-10. (Sheet 13)

Stores Limitations – Index

STORES	CONFIGURATION — SHEET NUMBER																																	
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	30.1	31	32	33	34	34.1	34.2	35	35.1	36	37	38	39	40	41	42	43	43.1
SUSPENSION EQUIPMENT																																		
AIM-9 LAUNCHER/ADAPTER	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PYLON WITH MAU-12C/A	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
ECM CENTERLINE ADAPTER	●	●	●		●	●	●		●	●		●	●	●	●	●	●	●		●	●	●	●	●	●	●		●	●	●	●	●	●	●
TER-9/A					●	●	●	●		●	●	●	●	●				●	●	●					●					●			●	●
LAU-88/A						●		●		●	●						●														●	●		
LAU-117/A											●																					●		
SUU-20A/A, B/A														●	●	●	●			●	●													

STORES	CONFIGURATION — SHEET NUMBER																																	
	44	45	46	47	48	49	50	51	52	52.1	52.2	52.3	53	54	55	56	57	57.1	57.2	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
SUSPENSION EQUIPMENT																																		
AIM-9 LAUNCHER/ADAPTER	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							
PYLON WITH MAU-12C/A	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							
ECM CENTERLINE ADAPTER	●	●	●	●	●	●	●	●	●	●	●	●						●	●															
TER-9/A					●		●	●			●				●	●		●	●															
LAU-88/A																																		
LAU-117/A																																		
SUU-20A/A, B/A																																		

Figure 5-10. (Sheet 14)

Stores Limitations

MISSILE		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
10.01. AIM-9	1	⊗				8 OPT				⊗	A/C	9.0 -3	6.0 -1	I	A/C	0.0 TO 6.5	A/C	NA	NA	NA	22 961	–
	2	⊗	⊗			8 OPT			⊗	⊗											47 1488	–
	3	⊗						8		⊗				III							33 1178	–
	4	⊗		8 -17 -131				8 -17 -131		⊗											66 1670	–
	5	⊗				(300)				⊗	600 1.6	6.5 (9.0) -2	5.0 (6.0) -1	I	600 1.6				600 1.6	600 1.6	29 2814	–
	6	⊗	⊗			(300)			⊗	⊗											58 3341	–
	7	⊗				(300)		8		⊗				III							62 3654	–

REMARKS:

Line 10.01.4: -17 ECM pod used for DRAG INDEX/CONFIG WEIGHT.

Figure 5-10. (Sheet 15)

Stores Limitations

MISSILE		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE- DEGREES	SELECTIVE AUX SPNSN MAX KIAS/ MACH	SELECTIVE FUEL TANKS MAX KIAS/ MACH	EMERGENCY MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—									
10.01. AIM-9	8	⊠		8 -17 -131		(300)		8 -17 -131		⊠				III						600 1.6	95 4146	–
	9	⊠			(370)	8 OPT	(370)			⊠				II					600 1.6		67 6671	–
	10	⊠	⊠		(370)	8	(370)		⊠	⊠	600 1.6	5.5 (9.0) -2	4.4 (6.0) -1	[I]	600 1.6	0.0 TO 6.5	A/C	NA		300 0.7	96 7198	–
	11	⊠	⊠		(370)		(370)		⊠	⊠									525 1.4		74 6575	–
	12	⊠			(370)		(370)	8		⊠				III					475 0.8		86 6888	–
	13	⊠		8 -17 -131	(370)		(370)	8 -17 -131		⊠											126 7380	–
	14	⊠	⊠ OPT	⊠				⊠	⊠ OPT	⊠	A/C	9.0 -3	6.0 -1	II [I]	A/C				NA	NA	48 1392	–

REMARKS:

Line 10.01.8 and 10.01.13: -17 ECM pod used for DRAG INDEX/CONFIG WEIGHT.

Figure 5-10. (Sheet 16)

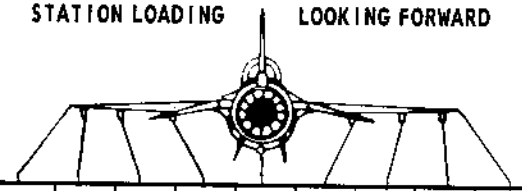
Stores Limitations

MISSILE		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOAD-ING CATE-GORY (10) (11)				SELECTIVE		EMER-GENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
10.01. AIM-9	15	⊠	⊠ OPT	⊠		8		⊠	⊠ OPT	⊠	A/C	8.5 -2	5.5 -1	II [I]	A/C	0.0 TO 6.5	A/C	NA	NA	NA	70 2015	–
	16	⊠	⊠ OPT	⊠		(300)		⊠	⊠ OPT	⊠	600 1.6	6.5 (7.0) -2	5.0 (5.5) -1		600 1.6				600 1.6	600 1.6	77 3868	–
	17	⊠	⊠ OPT	⊠	(370)		(370)	⊠	⊠ OPT	⊠		5.5 (7.0) -2	4.4 (5.5) -1	III [I]					475 0.8	300 0.7	93 7102	–
	18	⊠	⊠ OPT	⊠	(370)	8	(370)	⊠	⊠ OPT	⊠		5.5 (6.5) -2							550 0.9		115 7725	–
	19	⊠			(370)	(300)	(370)			⊠				III					STA 5 500 0.9 STA 4 & 6 600 1.6		78 8524	–

REMARKS:

Figure 5-10. (Sheet 17)

Stores Limitations

MISSILE		STATION LOADING LOOKING FORWARD 									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOAD-ING CATE-GORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE		EMER-GENCY		
												SYM +/—	ROLL +/—					AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9												
10.01. AIM-9	20	⊠	⊠		(370)	(300)	(370)		⊠	⊠	600 1.6	5.5 (6.5) -2	4.4 (5.5) -1	III	600 1.6	0.0 TO 6.5	A/C	NA	STA 5 500 0.9 STA 4 & 6 525 1.4	300 0.7	107 9051	-
	21	⊠	⊠ OPT	⊠	(370)	(300)	(370)	⊠	⊠ OPT	⊠									STA 5 500 0.9 STA 4 & 6 475 0.8		126 9578	-

REMARKS:

Figure 5-10. (Sheet 18)

Stores Limitations

REVERT TO LINE		STATION LOADING LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON ④ ⑳			DRAG INDEX/ CONFIG WEIGHT ②	REVERT TO LINE ③
											MAX KIAS/ MACH	MAX ACCEL G ①		LOAD-ING CATE-GORY ⑩ ⑪	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE- DEGREES	SELECTIVE AUX SPNSN MAX KIAS/ MACH	SELECTIVE FUEL TANKS MAX KIAS/ MACH	EMER-GENCY MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—									
20.01	1	⊠				▯				⊠	A/C	9.0 -3	6.0 -1	I	AIM-9 EMPLOYMENT LIMITS			NA	NA	NA	6 510	–
	2	⊠				▯		8		⊠				III	A/C	0.0 TO 6.5	A/C				39 1350	–
	3	⊠			▯	8 OPT	▯			⊠				II [1]							47 1482	–
	4	⊠		▯		8 OPT				⊠				III							37 1221	–
	5	⊠		▯		8 OPT		▯		⊠				II [1]							51 1482	–
	6	⊠		▽		8 OPT		▽		⊠								550 0.9		550 0.9	69 1667	–

REMARKS:

Figure 5-10. (Sheet 19)

Stores Limitations

REVERT TO LINE		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON ④ ⑳			DRAG INDEX/ CONFIG WEIGHT ②	REVERT TO LINE ③
											MAX KIAS/ MACH	MAX ACCEL G ①		LOADING CATEGORY ⑩ ⑪				SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
20.01.	7	⊠	⊠	▽		8 OPT		▽	⊠	⊠				II [1]	AIM-9 EMPLOYMENT LIMITS			550 0.9		550 0.9	98 2195	–
	8	⊠		T		8 OPT		T		⊠				III [1]				300 0.7		300 0.7	83 2418	–
	9	⊠		▯	▯		▯	▯		⊠											58 1380	–
	10	⊠		▯	▯	8	▯	▯		⊠	A/C	9.0 -3	6.0 -1	II [1]	A/C	0.0 TO 6.5	A/C	NA	NA	NA	76 2003	–
	11	⊠	⊠	▯	▽		▽	▯	⊠	⊠										550 0.9	101 2093	–
	12	⊠		▯	▽	8 OPT	▽	▯		⊠								550 0.9			94 2189	–
	13	⊠		▽	▽		▽	▽		⊠										300 0.7	94 1752	–

REMARKS:

Figure 5-10. (Sheet 20)

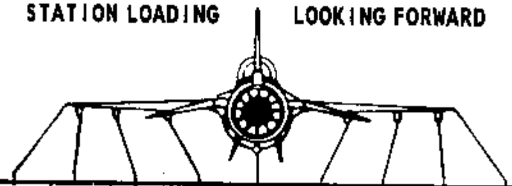
Stores Limitations

REVERT TO LINE GP/STORE	LINE	STATION LOADING 1	2	3	4	5	6	7	8	LOOKING FORWARD 9	CARRIAGE MAX KIAS/MACH	CARRIAGE MAX ACCEL G ① SYM +/—	CARRIAGE MAX ACCEL G ① ROLL +/—	LOADING CATEGORY ⑩ ⑪	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/DIVE ANGLE-DEGREES	JETTISON ④ ⑳ SELECTIVE AUX SPNSN MAX KIAS/MACH	JETTISON SELECTIVE FUEL TANKS MAX KIAS/MACH	JETTISON EMERGENCY MAX KIAS/MACH	DRAG INDEX/CONFIG WEIGHT ②	REVERT TO LINE ③
20.01.	14	⊗		▽	▽	8	▽	▽		⊗	A/C	9.0 -3	6.0 -1	II [1]	AIM-9 EMPLOYMENT LIMITS			550 0.9	NA	300 0.7	112 2375	–
	15	⊗		▯				8		⊗				III	A/C					NA	48 1438	–
	16	⊗			▯	(300)	▯			⊗				II [1]							54 3335	–
	17	⊗			▯	(300)		8		⊗	600 1.6	6.5 (9.0) -2	5.0 (6.0) -1	III	600 1.6	0.0 TO 6.5	A/C	NA	550 0.9	550 0.9	77 3914	–
	18	⊗		▯		(300)		8		⊗											77 3914	–
	19	⊗		▯		(300)				⊗											44 3074	–

REMARKS:

Figure 5-10. (Sheet 21)

Stores Limitations



REVERT TO LINE		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOAD-ING CATE-GORY (10) (11)				SELECTIVE		EMER-GENCY		
												SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9												
20.01	20	⊗		▯		(300)		▯		⊗					AIM-9 EMPLOYMENT LIMITS			NA			58 3335	–
	21	⊗		▽		(300)		▽		⊗				II [1]				550 0.9		550 0.9	76 3521	–
	22	⊗	⊗	▽		(300)		▽	⊗	⊗											105 4048	–
	23	⊗		T		(300)		T		⊗	600 1.6	6.5 (9.0) -2	5.0 (6.0) -1	III [1]	600 1.6	0.0 TO 6.5	A/C	300 0.7	550 0.9	300 0.7	90 4271	–
	24	⊗		▯	▯	(300)	▯	▯		⊗				II [1]				NA		550 0.9	83 3856	–
	25	⊗		▯	▽	(300)	▽	▯		⊗											101 4042	–
	26	⊗		▽	▽	(300)	▽	▽		⊗								550 0.9		300 0.7	119 4228	–

REMARKS:

Figure 5-10. (Sheet 22)

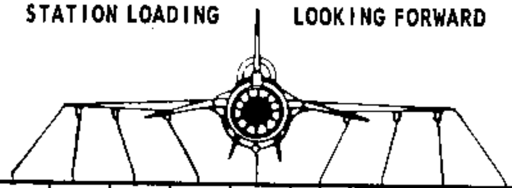
Stores Limitations

REVERT TO LINE		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
20.01	27	⊗		8 -131	▯	300	▯	▯		⊗		5.5 (7.33) -2	4.4 (6.0) -1	III	AIM-9 EMPLOYMENT LIMITS				550 0.9	550 0.9	112 4490	-
	28	⊗			370	▯	370			⊗				II [1]					600 1.6	600 1.6	51 6220	-
	29	⊗			370	▯	370	8		⊗	600 1.6	5.5 (9.0) -2	4.4 (6.0) -1	III	600 1.6	0.0 TO 6.5	A/C	NA	475 0.8	475 0.8	92 7060	-
	30	⊗		▯	370	8 OPT	370			⊗									550 0.9 (5)	550 0.9 (5)	82 6931	-
	31	⊗		▯	370	8	370	▯		⊗				III [1]					550 0.9	550 0.9	96 7192	-
	32	⊗		▯	370		370	▯		⊗									475 0.8	475 0.8	74 6569	-

REMARKS:

Figure 5-10. (Sheet 23)

Stores Limitations

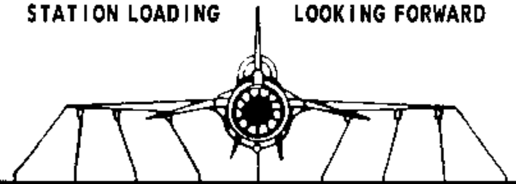


REVERT TO LINE		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON ④ ⑳			DRAG INDEX/ CONFIG WEIGHT ②	REVERT TO LINE ③
											MAX KIAS/ MACH	MAX ACCEL G ①		LOADING CATEGORY ⑩ ⑪				SELECTIVE		EMERGENCY		
												SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE- DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9												
20.01	33	⊗		▽	(370)		(370)	▽		⊗	600 1.6	5.5 (9.0) -2	4.4 (6.0) -1	III [1]	AIM-9 EMPLOYMENT LIMITS 600 1.6	0.0 TO 6.5	A/C	550 0.9	475 0.8	300 0.7	108 6755	–
	34	⊗		▽	(370)	8	(370)	▽		⊗									550 0.9		130 7378	–
	35	⊗		T	(370)		(370)	T		⊗								300 0.7	475 0.8		117 7505	–
	36	⊗		T	(370)	8	(370)	T		⊗									550 0.9		139 8128	–
	37	⊗		▯	(370)	(300)	(370)			⊗		5.5 (7.33) -2	4.4 (5.5) -1	III				NA	STA 5 500 0.9 STA 4 & 6 475 0.8		93 8784	–
	38	⊗		▯	(370)	(300)	(370)	▯		⊗											107 9045	–

REMARKS:

Figure 5-10. (Sheet 24)

Stores Limitations

REVERT TO LINE		STATION LOADING — LOOKING FORWARD 									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE		EMERGENCY		
												SYM +/—	ROLL +/—					AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9												
20.01	39	⊠		▽	(370)	(300)	(370)	▽		⊠					AIM-9 EMPLOYMENT LIMITS			550 0.9	STA 5 500 0.9		141 9231	–
	40	⊠		T	(370)	(300)	(370)	T		⊠	600 1.6	5.5 (7.33) -2	4.4 (5.5) -1	III	600 1.6	0.0 TO 6.5	A/C	300 0.7	STA 4 & 6 475 0.8	300 0.7	160 9981	–
	41	⊠		▯	(370)	(300)	(370)	8		⊠								NA			133 9625	–
	42	⊠		■	(370)	8 OPT	(370)	■		⊠		6.5 (9	4.5 (6.0) -1	III [1]				300 0.7	550 0.9 (5)		101 7581	–
	43	⊠		■		8 OPT		■		⊠	A/C	9.0 -3	6.0 -1	II [1]	A/C				NA		56 1871	–

REMARKS:

Figure 5-10. (Sheet 25)

Stores Limitations

TRAINING		STATION LOADING LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE AUX SPNSN MAX KIAS/ MACH	SELECTIVE FUEL TANKS MAX KIAS/ MACH	EMERGENCY MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—									
30.01 BDU-33B/B BDU-33D/B	1	⊗		∴		8 OPT		∴		⊗	550 0.95	6.5 -2	5.0 -1	III	550 0.95	0.5 TO 5.0	45/60	550 0.9	NA	550 0.9	75 1818	20.01.6
	2	⊗		∴		(300)		∴		⊗									550 0.9		82 3671	20.01.21
	3	⊗		∴	(370)	8 OPT	(370)	∴		⊗		5.5 (6.5) -2	4.4 (5.0) -1						550 0.85 (5)	300 0.7	140 7528	20.01.34
	4	⊗		∴	(370)	(300)	(370)	∴		⊗									STA 5 500 0.9 STA 4 & 6 475 0.75		151 9381	20.01.39
	5	⊗		∴	∴		∴	∴		⊗		6.5 -2	5.0 -1						NA		117 2052	20.01.13

REMARKS:

Minimum release interval is 60 ms for pairs.

Figure 5-10. (Sheet 26)

Stores Limitations

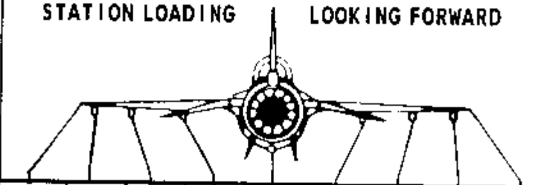
TRAINING GP/STORE	LINE	STATION LOADING LOOKING FORWARD 1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/ MACH	CARRIAGE MAX ACCEL G ① SYM +/—	CARRIAGE MAX ACCEL G ① ROLL +/—	LOAD-ING CATE-GORY ⑩ ⑪	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/ MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/ DIVE ANGLE-DEGREES	JETTISON ④ ⑳ SELECTIVE AUX SPNSN MAX KIAS/ MACH	JETTISON ④ ⑳ SELECTIVE FUEL TANKS MAX KIAS/ MACH	JETTISON ④ ⑳ EMER-GENCY MAX KIAS/ MACH	DRAG INDEX/ CONFIG WEIGHT ②	REVERT TO LINE ③
30.01	6										550 0.95	6.5 -2	5.0 -1	III	550 0.95	0.5 TO 5.0	45/60	550 0.9	NA	300 0.7	139 2675	20.01.14
BDU-33B/B BDU-33D/B	7					300													550 0.9		146 4528	20.01.26

REMARKS:

Minimum release interval is 60 ms for pairs.

Figure 5-10. (Sheet 27)

Stores Limitations



TRAINING GP/STORE	LINE	STATION LOADING LOOKING FORWARD 1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/MACH	CARRIAGE MAX ACCEL G (1) SYM +/—	CARRIAGE MAX ACCEL G (1) ROLL +/—	LOADING CATEGORY (10) (11)	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/DIVE ANGLE-DEGREES	JETTISON (4) (20) SELECTIVE AUX SPNSN MAX KIAS/MACH	JETTISON (4) (20) SELECTIVE FUEL TANKS MAX KIAS/MACH	JETTISON (4) (20) EMERGENCY MAX KIAS/MACH	DRAG INDEX/CONFIG WEIGHT (2)	REVERT TO LINE (3)
30.02. SUU-20A/A SUU-20B/A BDU-33B/B BDU-33D/B (MK106 2.75" FFAR TRAINING ROCKET)	1					OPT					550 0.95	6.5 -2	5.0 -1	III	550 0.95	BDU-33 0.5 TO 5.0	BDU-33 45/60	STA 7 550 0.9	NA	300 0.7	77 2152	–
	2					(300)													550 0.9		84 4102	–
	3				(370)	OPT	(370)					5.5 (6.5) -2	4.4 (5.0) -1			2.75" FFAR 0.5 TO 4.0	2.75" FFAR 0/60	STA 3 300 0.7	550 0.85 (5)		142 7862	–
	4				(370)	(300)	(370)									MK106 0.7 TO 5.0	MK106 45/30	See Remark 2	STA 5 500 0.9 STA 4 & 6 475 0.75		153 9709	–

REMARKS:

1. BDU-33's and MK106's are not jettisonable from SUU-20.
2. SUU-20 without 2.75" FFAR is jettisonable.
3. MK106 may be employed from SUU-20 only.
4. Any combination of BDU-33's and MK106's may be carried in SUU-20.
5. Minimum release interval of BDU-33 from TER-9/A is 60 ms for pairs.
6. 2.75" FFAR may be carried and employed with any BDU-33/MK106 loading.
7. CONFIG WEIGHT based on 6 BDU's and 4 M151 rockets in SUU-20B/A.

Figure 5-10. (Sheet 28)

Stores Limitations

TRAINING		STATION LOADING LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON ④ ⑳			DRAG INDEX/ CONFIG WEIGHT ②	REVERT TO LINE ③
											MAX KIAS/ MACH	MAX ACCEL G ①		LOAD-ING CATE-GORY ⑩ ⑪				SELECTIVE		EMER-GENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
30.03.	1	⊠		O		8 OPT		O OPT		⊠		7.33 -2	5.5 -1			BDU-33 0.5 TO 5.0	BDU-33 45/60	STA 3 & 7 300 0.7	NA		79 2485	–
SUU-20A/A SUU-20B/A (BDU-33B/B	2	⊠		O		(300)		O OPT		⊠		6.5 (7.33) -2							550 0.9		86 4338	–
BDU-33D/B MK106 2.75" FFAR TRAINING ROCKET)	3	⊠		O	(370)	8 OPT	(370)	O OPT		⊠	550 1.2	5.5 (7.33) -2	4.4 (5.5) -1	III	550 0.95	2.75" FFAR 0.5 TO 4.0	2.75" FFAR 0/60	See Remark 2	550 0.9 ⑤	300 0.7	144 8195	–
	4	⊠		O	(370)	(300)	(370)	O OPT		⊠						MK106 0.7 TO 5.0	MK106 45/30		STA 5 500 0.9 STA 4 & 6 475 0.8		155 10,048	–
	5	⊠		O				8		⊠		7.33 -2	5.5 -1					STA 3 300 0.7 See Remark 2	NA		62 1940	–

REMARKS:

1. BDU-33's and MK106's are not jettisonable from SUU-20.
2. SUU-20 without 2.75" FFAR is jettisonable.
3. Any combination of BDU-33's and MK106's may be carried in SUU-20.
4. 2.75" FFAR may be carried and employed with any BDU-33/MK106 loading.
5. CONFIG WEIGHT based on 6 BDU's and 4 M151 rockets in SUU-20B/A.

Figure 5-10. (Sheet 29)

Stores Limitations

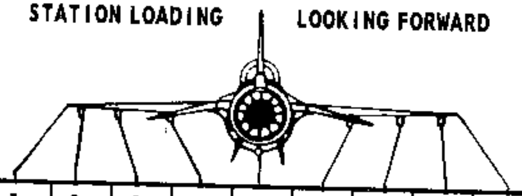
TRAINING		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON ④ ⑳			DRAG INDEX/ CONFIG WEIGHT ②	REVERT TO LINE ③
											MAX KIAS/ MACH	MAX ACCEL G ①		LOADING CATEGORY ⑩ ⑪	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE AUX SPNSN MAX KIAS/ MACH	SELECTIVE FUEL TANKS MAX KIAS/ MACH	EMERGENCY MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—									
30.03.	6	⊗		⊖		(300)		8		⊗		6.5 (7.33) -2				BDU-33 0.5 TO 5.0	BDU-33 45/60	STA 3 300 0.7 See Remark 2	550 0.9		91 4416	-
SUU-20A/A SUU-20B/A (BDU-33B/B BDU-33D/B MK106 2.75" FFAR TRAINING ROCKET)	7	⊗		⊖	(370)		(370)	8		⊗									475 0.8		124 7650	-
	8	⊗		⊖	(370)	(300)	(370)	8		⊗	550 1.2	5.5 (7.33) -2	4.4 (5.5) -1	III	550 0.9	2.75" FFAR 0.5 TO 4.0	2.75" FFAR 0/60		STA 5 500 0.9 STA 4 & 6 475 0.8	300 0.7	157 10,126	-
	9	⊗			⊖	8 OPT	⊖			⊗		7.33 -2	5.5 -1			MK106 0.7 TO 5.0	MK106 45/30	STA 4 & 6 300 0.7 See Remark 2	NA		79 2485	-
	10	⊗			⊖	(300)	⊖			⊗		6.5 (7.33) -2	4.4 (5.5) -1						550 0.9		88 4338	-

REMARKS:

1. BDU-33's and MK106's are not jettisonable from SUU-20.
2. SUU-20 without 2.75" FFAR is jettisonable.
3. Any combination of BDU-33's and MK106's may be carried in SUU-20.
4. 2.75" FFAR may be carried and employed with any BDU-33/MK106 loading.
5. CONFIG WEIGHT based on 6 BDU's and 4 M151 rockets in SUU-20B/A.

Figure 5-10. (Sheet 30)

Stores Limitations



TRAINING		STATION LOADING LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
																		AUX SPSN	FUEL TANKS			
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE- DEGREES	MAX KIAS/ MACH	MAX KIAS/ MACH	MAX KIAS/ MACH		
30.04. TGM-65 SUU-20A/A SUU-20B/A (BDU-33B/B BDU-33D/B MK106 2.75" FFAR TRAINING ROCKET)	1	⊠		♁	(370)	8 OPT	(370)	⊖		⊠	550 1.2	5.5 (7.33) -2	4.4 (5.5) -1	III	550 0.9	BDU-33 0.5 TO 5.0 2.75" FFAR 0.5 TO 4.0 MK106 0.7 TO 5.0	BDU-33 45/60 2.75" FFAR 0/60 MK106 45/30	STA 7 300 0.7 See Remark 2	550 0.85 5		161 8617	–
	2	⊠		♁	(370)	(300)	(370)	⊖		⊠									STA 5 500 0.9 STA 4 & 6 475 0.8	300 0.7	173 10470	–

REMARKS:

1. BDU-33's and MK106's are not jettisonable from SUU-20.
2. SUU-20 without 2.75" FFAR is jettisonable.
3. Any combination of BDU-33's and MK106's may be carried in SUU-20.
4. 2.75" FFAR may be carried and employed with any BDU-33/MK106 loading.
5. CONFIG WEIGHT based on 6 BDU's and 4 M151 rockets in SUU-20B/A.
6. TGM-65 is not jettisonable from LAU-88/A.

Figure 5-10. (Sheet 30.1)

Stores Limitations

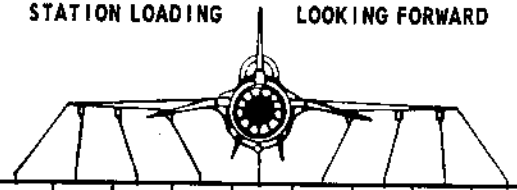
FERRY CONFIGURATION		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE		EMERGENCY		
												SYM +/—	ROLL +/—					AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9												
40.01.	1	⊠				⊖				⊠				III (7)					NA	NA	19 935	–
MXU-648/A TRAVEL POD	2	⊠			(370)	⊖	(370)			⊠									450 0.9	450 0.9	64 6645	–
TER-9/A	3	⊠			⊖		⊖ OPT			⊠	450 0.9	3.0 0	2.5 0.5	III	NA	NA	NA	NA	NA	NA	49 1709	–
	4	⊠			⊖	(300)	⊖ OPT			⊠									450 0.9	450 0.9	80 4185	–
	5	⊠		⊖		8 OPT		⊖ OPT		⊠									NA	NA	97 2518	–
	6	⊠		⊖		(300)		⊖ OPT		⊠									450 0.9	450 0.9	104 4371	–
	7	⊠		⊖	(370)	8 OPT	(370)	⊖ OPT		⊠									450 0.75	450 0.75	157 8228	–

REMARKS:

1. Travel Pod and Travel Pod/TER-9/A combinations are nonjettisonable.
2. Max bank angle change of 45°.
3. Max carriage weight is 300 pounds. Distribute weight evenly in pod.
4. CONFIG WEIGHT is with full pods.
5. Lines 40.01.5–40.01.7: TER-9/A is optional. Weight is included in CONFIG WEIGHT.

Figure 5-10. (Sheet 31)

Stores Limitations



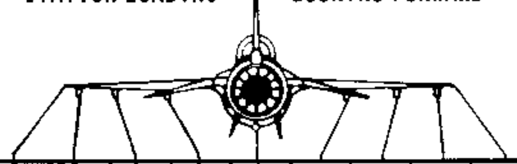
FERRY CONFIGURATION GP/STORE	LINE	STATION LOADING LOOKING FORWARD 1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/MACH	CARRIAGE MAX ACCEL G (1) SYM +/−	CARRIAGE MAX ACCEL G (1) ROLL +/−	LOADING CATEGORY (10) (11)	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/DIVE ANGLE-DEGREES	JETTISON (4) (20) SELECTIVE AUX SPNSN MAX KIAS/MACH	JETTISON SELECTIVE FUEL TANKS MAX KIAS/MACH	JETTISON EMERGENCY MAX KIAS/MACH	DRAG INDEX/CONFIG WEIGHT (2)	REVERT TO LINE (3)
40.01. MXU-648/A TRAVEL POD TER-9/A	8	⊗			370	300	370	OPT		⊗	450 0.9	3.0 0	2.5 0.5	III	NA	NA	NA	NA	STA 5 450 0.9 STA 4 & 6 450 0.75	300 0.7	166 10,081	—

REMARKS:

1. Travel Pod and Travel Pod/TER-9/A combinations are nonjettisonable.
2. Max bank angle change of 45°.
3. Max cargo weight is 300 pounds. Distribute weight evenly in pod.
4. CONFIG WEIGHT is with full pods.
5. Line 40.01.8: TER-9/A is optional. Weight is included in CONFIG WEIGHT.

Figure 5-10. (Sheet 32)

Stores Limitations



FERRY CONFIGURATION		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOAD-ING CATE-GORY (10) (11)				SELECTIVE		EMER-GENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
40.02.	1	⊠		▽	⊖	8 OPT		▽		⊠	450 0.9	3.0 0	2.5 0.5	III	NA	NA	NA	450 0.9	NA	300 0.7	96 2353	–
MXU-648/A TRAVEL POD	2	⊠		▽	⊖	(300)		▽		⊠									450 0.9		104 4206	–
SUU-20A/A SUU-20B/B	3	⊠		⊖	▽	8 OPT		⬬		⊠								STA 4 450 0.9 STA 7 300 0.7 See Remark 5	NA		102 2762	–
TER-9/A	4	⊠		⊖	▽	(300)		⬬		⊠									450 0.9		110 4615	–
	5	⊠		⊖		8 OPT		⬬		⊠								STA 7 300 0.7 See Remark 5	NA		79 2408	–
	6	⊠		⊖		(300)		⬬		⊠									450 0.9		86 4261	–

REMARKS:

1. Travel Pod is nonjettisonable.
2. Max bank angle change of 45°.
3. Max cargo weight is 300 pounds. Distribute weight evenly in pod.
4. CONFIG WEIGHT is with full pods.
5. SUU-20 jettison limits are without 2.75" FFAR.

Figure 5-10. (Sheet 33)

Stores Limitations

FERRY CONFIGURATION GP/STORE	LINE	STATION LOADING — LOOKING FORWARD 1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/MACH	CARRIAGE MAX ACCEL G ① SYM +/—	CARRIAGE MAX ACCEL G ① ROLL +/—	LOADING CATEGORY ⑩ ⑪	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/DIVE ANGLE-DEGREES	JETTISON ④ ⑳ SELECTIVE AUX SPNSN MAX KIAS/MACH	JETTISON SELECTIVE FUEL TANKS MAX KIAS/MACH	JETTISON EMERGENCY MAX KIAS/MACH	DRAG INDEX/CONFIG WEIGHT ②	REVERT TO LINE ③
40.02. MXU-648/A TRAVEL POD SUU-20A/A SUU-20B/B	7	⊠		⊖	⊖	8 OPT		⊖		⊠	450 0.9	3.0 0	2.5 0.5	III	NA	NA	NA	STA 3 & 7 300 0.7 See Remark 5	NA	300 0.7	115 3170	–
	8	⊠		⊖	⊖	(300)		⊖		⊠									450 0.9		124 5023	–
	9	⊠		⊖	(370)	8 OPT	(370)	⊖		⊠								STA 7 300 0.7 See Remark 5	450 0.8		138 8118	–
	10	⊠		⊖	(370)	(300)	(370)	⊖		⊠									STA 5 450 0.9 STA 4 & 6 450 0.8		148 9971	–

REMARKS:

1. Travel Pod is nonjettisonable.
2. Max bank angle change of 45°.
3. Max cargo weight is 300 pounds. Distribute weight evenly in pod.
4. CONFIG WEIGHT is with full pods.
5. SUU jettison limits are without 2.75"FFAR.

Figure 5-10. (Sheet 34)

Stores Limitations

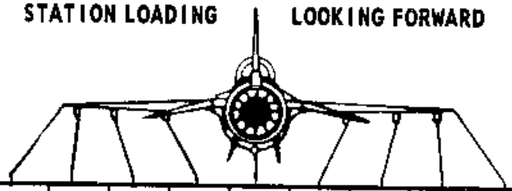
FERRY CONFIGURATION GP/STORE	LINE	STATION LOADING LOOKING FORWARD 1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/MACH	CARRIAGE MAX ACCEL G ① SYM +/—	CARRIAGE MAX ACCEL G ① ROLL +/—	CARRIAGE LOADING CATEGORY ⑩ ⑪	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/DIVE ANGLE-DEGREES	JETTISON ④ ⑳ SELECTIVE AUX SPNSN MAX KIAS/MACH	JETTISON ④ ⑳ SELECTIVE FUEL TANKS MAX KIAS/MACH	JETTISON ④ ⑳ EMERGENCY MAX KIAS/MACH	DRAG INDEX/CONFIG WEIGHT ②	REVERT TO LINE ③
40.03. MXU-648/A TRAVEL POD ECM	1	⊗		8	370	300	370	⊖		⊗	450 0.9	3.0 0	2.5 0.5	III	NA	NA	NA	NA	STA 5 450 0.9 STA 4 & 6 400 0.8	300 0.7	149 9713	–
	2	⊗		8 -17 -131	370	⊖	370	8 -17 -131		⊗										450 0.9	137 7989	–
	3			8	370	⊖	370	8			400 0.8									300 0.7	129 8042	–

REMARKS:

1. Travel Pod is nonjettisonable.
2. Max bank angle change 45°.
3. Max cargo weight is 300 pounds. Distribute weight evenly in pod.
4. CONFIG WEIGHT is with full pods.
5. Line 40.03.2:-17 ECM pod used for DRAG INDEX/CONFIG WEIGHT.
6. Line 40.03.3 if tip missiles are loaded, carriage limit is 450 KIAS/0.9 mach.

Figure 5-10. (Sheet 34.1)

Stores Limitations



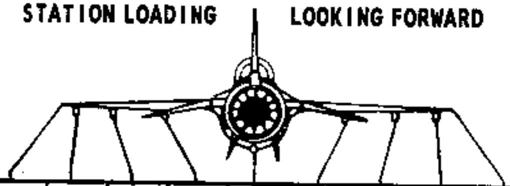
FERRY CONFIGURATION		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE- DEGREES	SELECTIVE		EMERGENCY		
												SYM +/—	ROLL +/—					AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9												
40.04. ECM PODS	1	⊠		8		8 OPT		8		⊠	500 0.9	5.5 -2	4.4 -1	III	NA	NA	NA	NA	NA	NA	88 2643	—
	2	⊠		8	370	8 OPT	370	8		⊠									500 0.9 (5)	500 0.9 (5)	150 8353	—
	3	⊠		8 -17 -131	370	300	370	8 -17 -131		⊠									STA 5 500 0.9 STA 4 & 6 475 0.8	300 0.7	162 10,206	—

REMARKS:

Carriage airspeed limit without tip missiles is 400 KIAS/0.8 mach when carrying -15 paired pods.

Figure 5-10. (Sheet 34.2)

Stores Limitations



DISPENSER GP/STORE	LINE	STATION LOADING LOOKING FORWARD 1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/ MACH	CARRIAGE MAX ACCEL G (1) SYM +/—	CARRIAGE MAX ACCEL G (1) ROLL +/—	LOADING CATEGORY (10) (11)	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/ MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/ DIVE ANGLE- DEGREES	JETTISON (4) (20) SELECTIVE AUX SPNSN MAX KIAS/ MACH	JETTISON (4) (20) SELECTIVE FUEL TANKS MAX KIAS/ MACH	JETTISON (4) (20) EMERGENCY MAX KIAS/ MACH	DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
50.01. BL-755 MK2	1	⊗		O		8 OPT		O		⊗	600 1.2	5.5 -2	4.4 -1	III	600 1.2	0.5 TO 4.0	45/60	NA	NA	Same as employment	95 2702	20.01.5
	2	⊗		O		(300)		O		⊗									550 0.9	550 0.9	102 4555	20.01.20
	3	⊗		O	(370)	8 OPT	(370)	O		⊗									550 0.9 (5)	300 0.7	159 8412	20.01.31
	4	⊗		O	(370)	(300)	(370)	O		⊗									STA 5 500 0.9 STA 4 & 6 475 0.8		170 10,265	20.01.38
	5	⊗		O	O	8	O	O		⊗									NA	Same as employment	168 4443	20.01.10
	6	⊗		O	O	(300)	O	O		⊗									550 0.9	300 0.7	177 6296	20.01.24

REMARKS:

Figure 5-10. (Sheet 35)

Stores Limitations

DISPENSER		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—					AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
50.01. BL-755 MK2	7					OPT												550 0.9 (8)	NA	550 0.9 (8)	172 4109	20.01.6
	8					(300)												300 0.7 (9)	550 0.9	300 0.7 (9)	179 5962	20.01.21
	9				(370)	OPT	(370)				550 0.95	5.5 -2	4.4 -2	III	500/ 0.85	-5 to 4.0	45/ 60		550 0.85 (5)	300 0.7 (9)	238 9819	20.01.34
	10					OPT												550 0.9 (8)	NA	550 0.9 (8)	223 5329	20.01.6
	11					(300)												300 0.7 (9)	550 0.9	300 0.7 (9)	230 7182	20.01.21
	12				(370)	OPT	(370)												550 0.85 (5)		292 11,039 (21)	20.01.34

REMARKS:

Line 50.01.12: Employment is authorized only after jettison of both 370-gallon fuel tanks.

Figure 5-10. (Sheet 35.1)

Stores Limitations

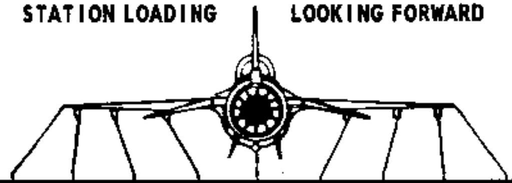
DISPENSER		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOAD-ING CATE-GORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE AUX SPNSN MAX KIAS/ MACH	SELECTIVE FUEL TANKS MAX KIAS/ MACH	EMER-GENCY MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—									
50.02. CBU-52/B, -58/B, -58A/B, -71/B, -71A/B	1	⊗		O		8 OPT		O		⊗	600 1.2	5.5 -2	4.4 -1	III	600 1.2	0.5 TO 4.0	45/60	NA	NA	Same as employ-ment	93 3082	20.01.5
	2	⊗		O		(300)		O		⊗									550 0.9	550 0.9	100 4935	20.01.20
	3	⊗		O	(370)	8 OPT	(370)	O		⊗									550 0.9 (5)	300 0.7	155 8792	20.01.31
	4	⊗		O	(370)	(300)	(370)	O		⊗									STA 5 500 0.9 STA 4 & 6 475 0.8		165 10,645	20.01.38
	5	⊗		O	O	8 OPT	O	O		⊗									NA	Same as employ-ment	163 5203	20.01.10
	6	⊗		O	O	(300)	O	O		⊗									550 0.9	300 0.7	170 7056	20.01.24

REMARKS:

CONFIG WEIGHT reflects CBU-58.

Figure 5-10. (Sheet 36)

Stores Limitations



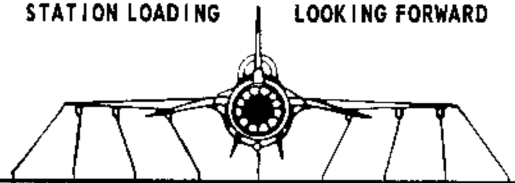
DISPENSER		STATION LOADING LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOAD-ING CATE-GORY (10) (11)				SELECTIVE		EMER-GENCY		
												SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9												
50.02. CBU-52/B, -58/B, -58A/B, -71/B, -71A/B	7	⊗		8 -17 -131	O	300	O	O		⊗	600 1.2	5.5 -2	4.4 -1	III	600 1.2	0.5 TO 4.0	45/60	NA	550 0.9	300 0.7	185 6933	20.01.27

REMARKS:

1. CONFIG WEIGHT reflects CBU-58.
2. -131 ECM pod used for DRAG INDEX/CONFIG WEIGHT.

Figure 5-10. (Sheet 37)

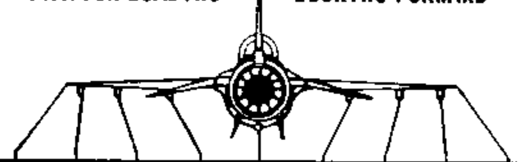
Stores Limitations

DISPENSER		STATION LOADING  LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON ④ ⑳			DRAG INDEX/ CONFIG WEIGHT ②	REVERT TO LINE ③
											MAX KIAS/ MACH	MAX ACCEL G ①		LOADING CATEGORY ⑩ ⑪	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE- DEGREES	SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—					AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
50.03 M129E2	1	⊗		O		8 OPT		O		⊗	450 0.9	3.0 -1	2.4 0	III	450 0.9	0.5 TO 3.0	10/30	NA	NA	Same as employ- ment	85 1893	20.01.5
	2	⊗		O		(300)		O		⊗									450 0.9		92 3746	20.01.20
	3	⊗		O	(370)	8 OPT	(370)	O		⊗									450 0.9 ⑤	300 0.7	147 7603	20.01.31
	4	⊗		O	(370)	(300)	(370)	O		⊗									STA 5 450 0.9 STA 4 & 6 450 0.8		157 9456	20.01.38
	5	⊗		O	O	8 OPT	O	O		⊗									NA	Same as employ- ment	147 2825	20.01.10
	6	⊗		O	O	(300)	O	O		⊗									450 0.9	300 0.7	154 4678	20.01.24

REMARKS:

Figure 5-10. (Sheet 38)

Stores Limitations



DISPENSER GP/STORE	LINE	1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/MACH	CARRIAGE MAX ACCEL G (1) SYM +/—	CARRIAGE MAX ACCEL G (1) ROLL +/—	LOADING CATEGORY (10) (11)	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/DIVE ANGLE-DEGREES	JETTISON (4) (20) SELECTIVE AUX SPNSN MAX KIAS/MACH	JETTISON (4) (20) SELECTIVE FUEL TANKS MAX KIAS/MACH	JETTISON (4) (20) EMERGENCY MAX KIAS/MACH	DRAG INDEX/CONFIG WEIGHT (2)	REVERT TO LINE (3)
50.04. MK20 MOD 3,4,6	1	⊗		O		8 OPT		O		⊗	600 1.2	5.5 -2	4.4 -1	III	550 0.95	0.5 TO 4.0	45/60	NA	NA	Same as employ-ment	75 2462	20.01.5
	2	⊗		O		300		O		⊗									550 0.9	550 0.9	82 4315	20.01.20
	3	⊗		O	370	8 OPT	370	O		⊗									550 0.9 (5)		137 8172	20.01.31
	4	⊗		O	370	300	370	O		⊗									STA 5 500 0.9 STA 4 & 6 475 0.8	300 0.7	147 10,025	20.01.38
	5	⊗		O	O	8 OPT	O	O		⊗									NA	Same as employ-ment	121 3963	20.01.10
	6	⊗		O	O	300	O	O		⊗									550 0.9	300 0.7	128 5816	20.01.24

REMARKS:

Employment limited to actual combat except for MK20 which has the approved fin retaining and fuze impeller band modification.

Figure 5-10. (Sheet 39)

Stores Limitations

DISPENSER GP/STORE	LINE	STATION LOADING LOOKING FORWARD 1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/ MACH	CARRIAGE MAX ACCEL G (1) SYM +/—	CARRIAGE MAX ACCEL G (1) ROLL +/—	CARRIAGE LOADING CATEGORY (10) (11)	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/ MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/ DIVE ANGLE-DEGREES	JETTISON (4) (20) SELECTIVE AUX SPNSN MAX KIAS/ MACH	JETTISON (4) (20) SELECTIVE FUEL TANKS MAX KIAS/ MACH	JETTISON (4) (20) EMERGENCY MAX KIAS/ MACH	DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
50.04. MK20 MOD 3,4,6	7	⊗		-17 -131	○	(300)	○	○		⊗	600 1.2	5.5 -2	4.4 -1	III	550 0.95	0.5 TO 4.0	45/60	NA	550 0.9	300 0.7	142 5961	20.01.27
	8	⊗				OPT				⊗	550 0.95					0.7 TO 4.0	15/60	550 0.9 (8)	NA	550 0.9 (8)	125 3628	20.01.6
	9	⊗			(370)	OPT	(370)			⊗								300 0.7 (9)	550 0.85 (5)	300 0.7 (9)	191 9338	20.01.34
	10	⊗				OPT				⊗					480 0.8	0.8 TO 4.0	15/15	550 0.9 (8)	NA	550 0.9 (8)	153 4608	20.01.6
	11	⊗			(370)	OPT	(370)			⊗								300 0.7 (9)	550 0.85 (5)	300 0.7 (9)	225 10,318	20.01.34

REMARKS:

1. Employment limited to actual combat except for MK20 which has the approved fin retaining and fuze impeller band modification.
2. Line 50.04.7: -131 ECM pod used for DRAG INDEX/CONFIG WEIGHT.

Figure 5-10. (Sheet 40)

Stores Limitations

MISSILES/ ROCKETS GP/STORE	LINE	STATION LOADING 1	2	3	4	5	6	7	8	LOOKING FORWARD 9	CARRIAGE MAX KIAS/ MACH	CARRIAGE MAX ACCEL G 1 SYM +/—	ROLL +/—	LOADING CATEGORY 10 11	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	JETTISON 4 20 SELECTIVE AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	EMERGENCY MAX KIAS/ MACH	DRAG INDEX/ CONFIG WEIGHT 2	REVERT TO LINE 3
60.01. AGM-65A AGM-65B	1					OPT					0.95	6.0 -2	5.0 -1	III	550 0.95	0.8 TO 1.2	5/45	300 0.7	NA	300 0.7	136 4274	20.01.8
	2					300						5.5 (6.0) -2	4.4 (5.0) -1						550 0.9		143 6127	20.01.23
	3				370	OPT	370												550 0.85 5		206 9984	20.01.36
	4				370	300	370												STA 5 500 0.9 STA 4 & 6 475 0.75		217 11,837 21	20.01.40
	5					OPT						6.0 -2	5.0 -1						NA		162 5202	20.01.8
	6					300						5.5 (6.0) -2	4.4 (5.0) -1						550 0.9		169 7055	20.01.23

REMARKS:

Lines 60.01.5 – 60.01.6: Employment of inboard shoulder missiles limited to actual combat.

Figure 5-10. (Sheet 41)

Stores Limitations

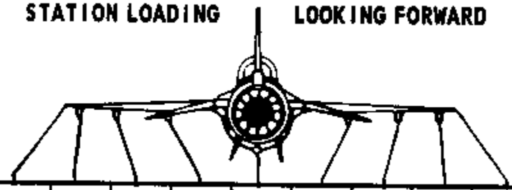
MISSILES/ ROCKETS GP/STORE	LINE	STATION LOADING — LOOKING FORWARD 1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/ MACH	CARRIAGE MAX ACCEL G (1) SYM +/—	CARRIAGE MAX ACCEL G (1) ROLL +/—	LOADING CATEGORY (10) (11)	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/ MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/ DIVE ANGLE- DEGREES	JETTISON (4) (20) SELECTIVE AUX SPNSN MAX KIAS/ MACH	JETTISON (4) (20) SELECTIVE FUEL TANKS MAX KIAS/ MACH	JETTISON (4) (20) EMERGENCY MAX KIAS/ MACH	DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
60.01. AGM-65A AGM-65B	7				370	OPT	370				0.95	5.5 (6.0) -2	4.4 (5.0) -1	III	550 0.95	0.8 TO 1.2	5/45	300 0.7	0.8 (5)	300 0.7	233 10,912	20.01.36
	8				370	300	370												STA 5 500 0.9 STA 4 & 6 475 0.7		243 12,765 (21)	20.01.40
	9				370	OPT	370					6.5 (7.33) -2 (-2.5)	4.5 (5.86) -1		550 0.9				550 0.85 (5)		131 8509	20.01.42
	10					OPT						7.33 -2.5	5.86 -1						NA		72 3799	20.01.43

REMARKS:

Lines 60.01.7 – 60.01.8: Employment of inboard shoulder missiles limited to actual combat.

Figure 5-10. (Sheet 42)

Stores Limitations



MISSILES/ ROCKETS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
60.02. 2.75" FFAR (LAU-3/A, C/A, LAU-3D/A) CRV7 (LAU-5003/A)	1	⊗		⊙		OPT		⊙		⊗	500 0.95	5.5 -2	4.4 -1	III				300 0.7	NA	300 0.7	100 2525	20.01.6
	2	⊗		⊙		(300)		⊙		⊗					FIRING ROCKETS 500 0.95	0.5 TO 4.0	0/60		500 0.9		107 4388	20.01.21
	3	⊗		⊙	(370)	OPT	(370)	⊙		⊗					JETTISON LAU FROM TER-9/A				500 0.85 (5)		169 8245	20.01.34
	4	⊗		⊙	(370)	(300)	(370)	⊙		⊗					500 0.9	0.8 TO 1.2	0/0		STA 5 500 0.9 STA 4 & 6 475 0.75		180 10,088	20.01.39

REMARKS:

1. DRAG INDEX is for LAU-3/A, C/A, D/A and LAU-5003/A with nose fairing. Add 9 drag count for each LAU with nose fairing gone.
2. CONFIG WEIGHT is for LAU-3/A, C/A, D/A with 19 2.75"FFAR's. Add 163 pounds when full LAU-5003/A is carried.
3. REVERT TO LINE used only after separation of both LAU's.
4. Certification is for LAU's without the aft fairings.
5. LAU-5003/A authorized for NATO use only.

Figure 5-10. (Sheet 43)

Stores Limitations

MISSILES/ ROCKETS GP/STORE	LINE	STATION LOADING LOOKING FORWARD 1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/ MACH	MAX ACCEL G (1) SYM +/—	ROLL +/—	LOADING CATEGORY (10) (11)	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	JETTISON (4) (20) SELECTIVE AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	EMERGENCY MAX KIAS/ MACH	DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
60.02. 2.75" FFAR (LAU-3/A, C/A, LAU-3D/A) CRV7 (LAU-5003/A)	5	⊠		⊙⊙		OPT		⊙⊙		⊠	500 0.95	5.5 -2	4.4 -1	III				300 0.7	NA	300 0.7	130 4649	20.01.6
	6	⊠		⊙⊙		(300)		⊙⊙		⊠					FIRING ROCKETS 500 0.85	0.5 TO 4.0	0/60		500 0.9		137 6502	20.01.21
	7	⊠		⊙⊙	(370)	OPT	(370)	⊙⊙		⊠									500 0.85 (5)		199 10,359	20.01.34
	8	⊠		⊙⊙	(370)	(300)	(370)	⊙⊙		⊠					JETTISON LAU FROM TER-9/A 500 0.85	0.8 TO 1.2	0/0		STA 5 500 0.9 STA 4 & 6 475 0.75		211 12,212 (21)	20.01.39

REMARKS:

1. DRAG INDEX is for LAU-3/A, C/A, D/A and LAU-5003/A with nose fairing. Add 9 drag count for each LAU with nose fairing gone.
2. CONFIG WEIGHT is for LAU-3/A, C/A, D/A with 19 2.75"FFAR's. Add 163 pounds when full LAU-5003/A is carried.
3. REVERT TO LINE used only after separation of both LAU's.
4. Certification is for LAU's without the aft fairings.
5. LAU-5003/A authorized for NATO use only.

Figure 5-10. (Sheet 43.1)

Stores Limitations

BOMBS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE		EMERGENCY		
																		AUX SPNSN	FUEL TANKS			
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—					MAX KIAS/ MACH	MAX KIAS/ MACH	MAX KIAS/ MACH		
70.01. BLU-1C/B (UN-FINNED)	1	⊗		O	O		O	O		⊗	450 0.9	3.0 -1	2.4 0	III	450 0.9	0.5 TO 3.0	10/30	NA	NA	300 0.7	118 4208	20.01.9
	2	⊗		O	O	8	O	O		⊗											140 4831	20.01.10
	3	⊗		O	O	(300)	O	O		⊗									450 0.9		151 6684	20.01.24

REMARKS:

Minimum release interval is 200 ms for pairs and 100 ms for singles.

Figure 5-10. (Sheet 44)

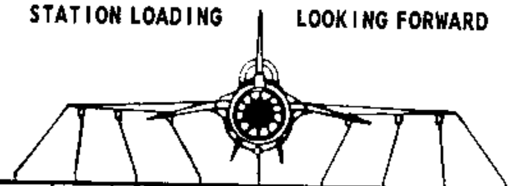
Stores Limitations

BOMBS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON ④ ⑳			DRAG INDEX/ CONFIG WEIGHT ②	REVERT TO LINE ③
											MAX KIAS/ MACH	MAX ACCEL G ①		LOADING CATEGORY ⑩ ⑪				SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE- DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
70.02. BLU-52	1	⊗		○		8 OPT		○		⊗	450 0.9	3.0 -1	2.4 0	III	450 0.9	0.5 TO 3.0	45/60	NA	NA	Same as employ- ment	79 2202	20.01.5
	2	⊗		○		300		○		⊗									450 0.9		86 4055	20.01.20
	3	⊗		○	370	8 OPT	370	○		⊗									450 0.9 ⑤	300 0.7	144 7912	20.01.31
	4	⊗		○	370	300	370	○		⊗									STA 5 450 0.9 STA 4 & 6 450 0.8		153 9765	20.01.38
	5	⊗		○	○	8 OPT	○	○		⊗									NA		146 3443	20.01.10
	6	⊗		○	○	300	○	○		⊗									450 0.9		155 5296	20.01.24

REMARKS:

Figure 5-10. (Sheet 45)

Stores Limitations



BOMBS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE		EMERGENCY MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—					AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH			
70.03. MC-1	1	⊗		O		8 OPT		O		⊗	600 1.2	4.0 -1	3.2 0	III	600 1.2	0.5 TO 4.0 (6)	45/60	NA	NA	Same as employment	75 2828	20.01.5
	2	⊗		O		(300)		O		⊗									550 0.9	550 0.9	82 4681	20.01.20
	3	⊗		O	(370)	8 OPT	(370)	O		⊗									550 0.9 (5)	300 0.7	138 8538	20.01.31
	4	⊗		O	(370)	(300)	(370)	O		⊗									STA 5 500 0.9 STA 4 & 6 475 0.8		147 10,391	20.01.38
	5	⊗		O	O	8 OPT	O	O		⊗									NA		124 4695	20.01.10
	6	⊗		O	O	(300)	O	O		⊗									550 0.9		132 6548	20.01.24

REMARKS:

Figure 5-10. (Sheet 46)

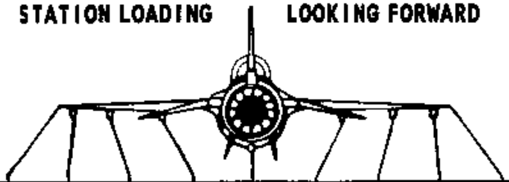
Stores Limitations

BOMBS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—					AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
70.04. MK82 (GENERAL PURPOSE)	1	⊗		O		8 OPT		O		⊗	600 1.2	5.5 -2	4.4 -1	III	600 1.2	0.5 TO 4.0 (6)	45/60	NA	NA	Same as employment	59 2502	20.01.5
	2	⊗		O		(300)		O		⊗									550 0.9	550 0.9	66 4355	20.01.20
	3	⊗		O	(370)	8 OPT	(370)	O		⊗									550 0.9 (5)	300 0.7	116 8212	20.01.31
	4	⊗		O	(370)	(300)	(370)	O		⊗									STA 5 500 0.9 STA 4 & 6 475 0.8		125 10,065	20.01.38
	5	⊗		O	O	8 OPT	O	O		⊗									NA	Same as employment	91 4043	20.01.10
	6	⊗		O	O	(300)	O	O		⊗									550 0.9	300 0.7	98 5896	20.01.24

REMARKS:

Figure 5-10. (Sheet 47)

Stores Limitations



BOMBS		STATION LOADING LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
																		AUX SPNSN	FUEL TANKS			
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	MAX KIAS/ MACH	MAX KIAS/ MACH	MAX KIAS/ MACH		
70.04.	7					OPT												550 0.9 (8)	NA	550 0.9 (8)	166 6269	20.01.12
MK82 (GENERAL PURPOSE)	8					300					550 0.95	5.5 -2	4.4 -1	III	550 0.9	0.5 TO 4.0	45/60	300 0.7 (9)	550 0.9	300 0.7 (9)	177 8122	20.01.25
	9					OPT												550 0.9 (8)	NA	550 0.9 (8)	115 4728	20.01.6
	10					300												300 0.7 (9)	550 0.9	300 0.7 (9)	122 6581	20.01.21
	11				370	OPT	370											300 0.7 (9)	550 0.85 (5)	300 0.7 (9)	184 10,438	20.01.34

REMARKS:

Figure 5-10. (Sheet 48)

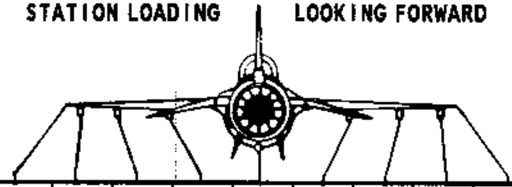
Stores Limitations

BOMBS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE- DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
70.05. MK82 SNAKEYE (RT) OR MK36 DESTRUCTOR	1	⊗		○		○○ OPT		○		⊗	600 1.2	5.5 -2	4.4 -1	III	500 0.95	0.5 TO 4.0 (6)	15/30	NA	NA	Same as employment	63 2582	20.01.5
	2	⊗		○		(300)		○		⊗									550 0.9	550 0.9	70 4435	20.01.20
	3	⊗		○	(370)	○○ OPT	(370)	○		⊗									550 0.9 (5)	300 0.7	119 8292	20.01.31
	4	⊗		○	(370)	(300)	(370)	○		⊗									STA 5 500 0.9 STA 4 & 6 475 0.8		130 10,145	20.01.38
	5	⊗		○	○	○○	○	○		⊗									NA	Same as employment	101 4203	20.01.10
	6	⊗		○	○	(300)	○	○		⊗									550 0.9	300 0.7	108 6056	20.01.24

REMARKS:

Figure 5-10. (Sheet 49)

Stores Limitations

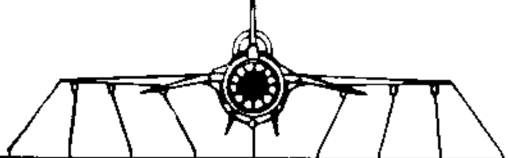
BOMBS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOAD-ING CATE-GORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE AUX SPNSN MAX KIAS/ MACH	SELECTIVE FUEL TANKS MAX KIAS/ MACH	EMER-GENCY MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—									
70.05.	7	⊗		O	∴	8 OPT	∴	O		⊗	550 0.95	5.5 -2	4.4 -1	III	500 0.95	0.5 TO 2.0	15/30	550 0.9 (8)	NA	550 0.9 (8)	157 5489	20.01.12
MK82 SNAKEYE (RT)	8	⊗		O	∴	(300)	∴	O		⊗								300 0.7 (9)	550 0.9	300 0.7 (9)	169 7342	20.01.25
OR	9	⊗		∴		8 OPT		∴		⊗						0.7 TO 2.0		550 0.9 (8)	NA	550 0.9 (8)	107 3868	20.01.6
MK36 DESTRUC-TOR	10	⊗		∴		(300)		∴		⊗								300 0.7 (9)	550 0.9	300 0.7 (9)	114 5721	20.01.21
	11	⊗		∴	(370)	8 OPT	(370)	∴		⊗									550 0.85 (5)		172 9578	20.01.34
	12	⊗		⁂		8 OPT		⁂		⊗						0.7 TO 1.5	15/15	550 0.9 (8)	NA	550 0.9 (8)	126 4968	20.01.6

REMARKS:

1. Restricted to retarded delivery only.
2. Minimum release interval during ripple release is 150 ms for pairs and 75 ms for singles.

?. (Sheet 50)

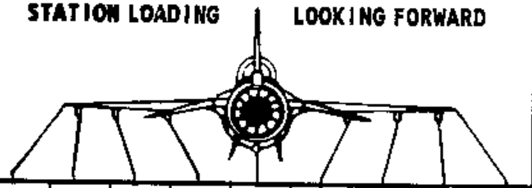
Stores Limitations

BOMBS		STATION LOADING  LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOAD-ING CATE-GORY (10) (11)				SELECTIVE		EMER-GENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
70.06. MK82 SNAKEYE (LD)	1	⊠		○	○	8 OPT	○	○		⊠	600 1.2	5.5 -2	4.4 -1	III	600 1.2	0.5 TO 4.0 (6)	45/60	NA	NA	Same as employ-ment	101 4203	20.01.10
	2	⊠		○	○	(300)	○	○		⊠									550 0.9	300 0.7	108 6056	20.01.24
	3	⊠		○	ꝏ	8 OPT	ꝏ	○		⊠	550 0.95				550 0.95	0.5 TO 4.0		550 0.9 (8)	NA	550 0.9 (8)	181 6389	20.01.12
	4	⊠		○	ꝏ	(300)	ꝏ	○		⊠								300 0.7 (9)	550 0.9	300 0.7 (9)	192 8442	20.01.25

REMARKS:

Figure 5-10. (Sheet 51)

Stores Limitations



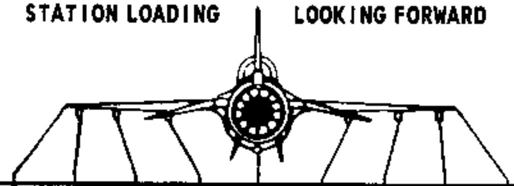
BOMBS GP/STORE	LINE	STATION LOADING LOOKING FORWARD 1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/ MACH	CARRIAGE MAX ACCEL G (1) SYM +/—	CARRIAGE MAX ACCEL G (1) ROLL +/—	LOADING CATEGORY (10) (11)	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/ MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/ DIVE ANGLE-DEGREES	JETTISON (4) (20) SELECTIVE AUX SPNSN MAX KIAS/ MACH	JETTISON (4) (20) SELECTIVE FUEL TANKS MAX KIAS/ MACH	JETTISON (4) (20) EMERGENCY MAX KIAS/ MACH	DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
70.07. MK84	1	⊗		O		8 OPT		O		⊗	600 1.2	5.5 -2	4.4 -1	III	600 1.2	0.5 TO 4.0	45/60	NA	NA	Same as employ-ment	72 5422	20.01.5
	2	⊗		O		(300)		O		⊗									550 0.9	550 0.9	79 7275	20.01.20
	3	⊗		O	(370)	8 OPT	(370)	O		⊗					550 0.9				550 0.9 (5)	300 0.7	136 11,132 (21)	20.01.31
	4	⊗		O	O	8 OPT	O	O		⊗					600 1.2				NA	Same as employ-ment	128 9883	20.01.10
	5	⊗		O	O	(300)	O	O		⊗									550 0.9	300 0.7	137 11,736 (21)	20.01.24
	6	⊗		8 -17 -131	O	(300)	O			⊗											127 8170	20.01.27

REMARKS:

Line 70.07.6: -131 ECM pod used for DRAG INDEX/CONFIG WEIGHT.

Figure 5-10. (Sheet 52)

Stores Limitations



BOMBS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON 4 20			DRAG INDEX/ CONFIG WEIGHT 2	REVERT TO LINE 3
											MAX KIAS/ MACH	MAX ACCEL G 1		LOADING CATEGORY 10 11				SELECTIVE		EMERGENCY		
												SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE- DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9												
70.08. BSU-49 (RT)	1	⊠		O		8 OPT		O		⊠	600 1.2	5.5 -2	4.4 -1	III	600 1.2	0.5 TO 4.0 6	15/30	NA	NA	Same as employ- ment	64 2562	20.01.5
	2	⊠		O		300		O		⊠									550 0.9	550 0.9	71 4416	20.01.20
	3	⊠		O	370	8 OPT	370	O		⊠									550 0.9 5	300 0.7	121 8273	20.01.31
	4	⊠		O	370	300	370	O		⊠									STA 5 500 0.9 STA 4 & 6 475 0.8		130 10,126	20.01.38
	5	⊠		O	O	8 OPT	O	O		⊠									NA	Same as employ- ment	96 3827	20.01.10
	6	⊠		O	O	300	O	O		⊠									550 0.9	300 0.7	103 5680	20.01.24

REMARKS:

Figure 5-10. (Sheet 52.1)

Stores Limitations

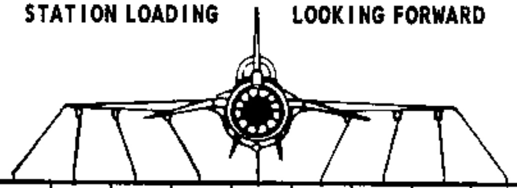
BOMBS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOAD-ING CATE-GORY (10) (11)				SELECTIVE		EMER-GENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
70.09. BSU-49 (RT) BSU-49 (LD)	1	⊠		O		8 OPT		O		⊠	550 0.95	5.5 -2	4.4 -1	III	550 0.95	0.5 TO 2.0	(RT) 15/30 (LD) 45/60	550 0.9 (8)	NA	550 0.9 (8)	159 5431	20.01.12
	2	⊠		O		(300)		O		⊠								300 0.7 (9)	550 0.9	300 0.7 (9)	171 7284	20.01.25
	3	⊠		O		8 OPT		O		⊠								550 0.9 (8)	NA	550 0.9 (8)	180 6511	20.01.12
	4	⊠		O		(300)		O		⊠								300 0.7 (9)	550 0.9	300 0.7 (9)	191 8364	20.01.25

REMARKS:

Minimum release interval is 150 ms for pairs and 75 ms for singles.

Figure 5-10. (Sheet 52.2)

Stores Limitations



BOMBS		STATION LOADING LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
												SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE- DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9												
70.09. BSU-50	1	⊗		O	(370)	OO OPT	(370)	O		⊗	600 1.2	5.5 -2	4.4 -1	III	600 1.2	0.5 TO 4.0	45/60	NA	550 0.9 (5)	300 0.7	140 11,213 (21)	20.01.31
	2	⊗		O	O	(300)	O	O		⊗									550 0.9		135 11,898 (21)	20.01.24
	3	⊗		O	O	OO OPT	O	O		⊗									NA	Same as employ- ment	144 10,045	20.01.10

REMARKS:

Figure 5-10. (Sheet 52.3)

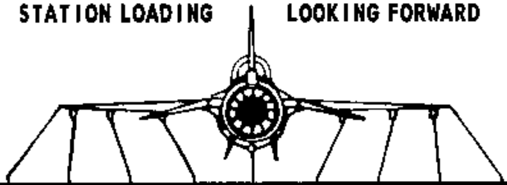
Stores Limitations

GUIDED BOMBS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)				
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY	DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
												SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9												
80.01. GBU-12/B -A/B -12B/B -12C/B -12D/B	1	⊗		O		8 OPT		O		⊗	600 1.2	5.5 -2	4.4 -1	III	600 1.2	0.5 TO 4.0 (6)	45/60	NA	NA	Same as employment	71 2704	20.01.5
	2	⊗		O		(300)		O		⊗									550 0.9	550 0.9	78 4557	20.01.20
	3	⊗		O	(370)	8 OPT	(370)	O		⊗									550 0.9 (5)	300 0.7	133 8414	20.01.31
	4	⊗		O	(370)	(300)	(370)	O		⊗									STA 5 500 0.9 STA 4 & 6 475 0.8		143 10,267	20.01.38
	5	⊗		O	O	8 OPT	O	O		⊗									NA	Same as employment	119 4576	20.01.10
	6	⊗		O	O	(300)	O	O		⊗									550 0.9	300 0.7	129 6300	20.01.24

REMARKS:

Figure 5-10. (Sheet 53)

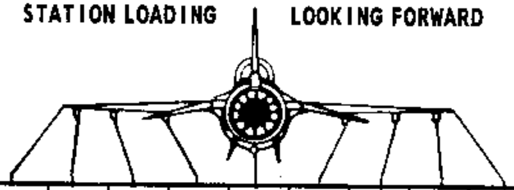
Stores Limitations

GUIDED BOMBS		STATION LOADING LOOKING FORWARD 									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
																		AUX SPNSN	FUEL TANKS			
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	MAX KIAS/ MACH	MAX KIAS/ MACH	MAX KIAS/ MACH		
80.02.	1	⊗		O		8 OPT		O		⊗	600 1.2	5.5 -2	4.4 -1	III	550 0.9	0.5 TO 1.2	45/60	NA	NA	Same as employment	85 5644	20.01.5
GBU-10/B -10A/B	2	⊗		O	370	8 OPT	370	O		⊗									550 0.9 (5)	300 0.7	147 11,354 (21)	20.01.31

REMARKS:

Figure 5-10. (Sheet 54)

Stores Limitations



MIXED LOADS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
90.01. BLU-52 AND MK82 SNAKEYE (LD OR RT)	1	⊠		BLU	MK	OPT	MK	BLU		⊠	450 0.9	3.0 -1	2.4 0	III	450 0.9	0.5 TO 3.0	45/60	450 0.9	NA	450 0.9	177 5109	20.01.12
	2	⊠		BLU	MK	300	MK	BLU		⊠								300 0.7	450 0.9	300 0.7	188 6962	20.01.25

REMARKS:

1. Line 90.01.1: Jettison limit for takeoff loading with slant-2 TER-9/A loading. For all other TER-9/A loadings, the jettison limit is 300 KIAS/0.7 mach.
2. Line 90.01.2: If the 300-gallon fuel tank has been jettisoned, the jettison limit is 450 KIAS/0.9 mach for slant-2 TER-9/A loading.

Figure 5-10. (Sheet 55)

Stores Limitations

MIXED LOADS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
90.02. CBU-52/B, -58/B, -58A/B, -71/B, -71A/B AND MK82 (GENERAL PURPOSE)	1	⊠		O CBU	MK	OPT	MK	O CBU		⊠	550 0.95	5.5 -2	4.4 -1	III	550 0.95	0.5 TO 4.0	45/60	550 0.9 (8)	NA	550 0.9 (8)	210 6849	20.01.12
	2	⊠		O CBU	MK	(300)	MK	O CBU		⊠								300 0.7 (9)	550 0.9	300 0.7 (9)	222 8702	20.01.25

REMARKS:

CONFIG WEIGHT reflects CBU-58.

Figure 5-10. (Sheet 56)

Stores Limitations

GP/STORE	LINE	1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/ MACH	CARRIAGE MAX ACCEL G ① SYM +/—	CARRIAGE MAX ACCEL G ① ROLL +/—	LOADING CATEGORY ⑩ ⑪	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/ MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/ DIVE ANGLE- DEGREES	JETTISON ④ ⑳ SELECTIVE AUX SPNSN MAX KIAS/ MACH	JETTISON ④ ⑳ SELECTIVE FUEL TANKS MAX KIAS/ MACH	JETTISON ④ ⑳ EMERGENCY MAX KIAS/ MACH	DRAG INDEX/ CONFIG WEIGHT ②	REVERT TO LINE ③
90.03. CBU-52/B, -58/B, -58A/B, -71/B, -71A/B AND MK84	1	⊠		O CBU	O MK		O MK	O CBU		⊠	600 1.2	5.5 -2	4.4 -1	III	600 1.2	0.5 TO 4.0	45/60	NA	NA	Same as employment	128 6922	20.01.9
	2	⊠		O CBU	O MK	8	O MK	O CBU		⊠											151 7545	20.01.10
	3	⊠		O CBU	O MK	300	O MK	O CBU		⊠									550 0.9	300 0.7	158 9398	20.01.24

STATION LOADING — LOOKING FORWARD

REMARKS:

1. Minimum release interval is 250 ms for pairs and 125 ms for singles.
2. CONFIG WEIGHT reflects CBU-58.

Figure 5-10. (Sheet 57)

Stores Limitations

MIXED LOADS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
																		AUX SPNSN	FUEL TANKS			
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE- DEGREES	MAX KIAS/ MACH	MAX KIAS/ MACH	MAX KIAS/ MACH		
90.04.	1	⊠		MK	CBU	300	CBU	MK		⊠	550/ 0.95	+5.5 TO -2.0	+4.4 TO -1.0	III	550/ 0.95	0.5 TO 4.0	45/60	300 0.7 (9)	550 0.9	300 0.7 (9)	251 11,182	20.01.25
CBU-58 AND MK84	2	⊠		MK	CBU	OPT	CBU	MK		⊠								550 0.9 (8)	NA	550 0.9 (8)	239 9329	20.01.12
	3	⊠		MK	CBU	OPT	CBU	MK		⊠											290 10,929 (21)	20.01.12

REMARKS:

Figure 5-10. (Sheet 57.1)

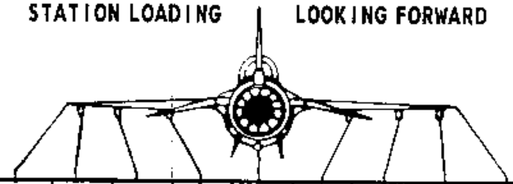
Stores Limitations

MIXED LOADS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
90.05. CBU-58 AND BSU-50	1	⊗		BSU	CBU	300	CBU	BSU		⊗	550/ 0.95	+5.5 TO -2.0	+4.4 TO -1.0	III	550/ 0.95	0.5 TO 4.0	STA 3 & 7 15/30 STA 4 & 6 45/60	300 0.7 (9)	550 0.9	300 0.7 (9)	255 11,262 (21)	20.01.25
	2	⊗		BSU	CBU	OPT	CBU	BSU		⊗								550 0.9 (8)	NA	550 0.9 (8)	243 9409	20.01.12
	3	⊗		BSU	CBU	OPT	CBU	BSU		⊗											294 11,009 (21)	20.01.12

REMARKS:

Figure 5-10. (Sheet 57.2)

Stores Limitations – BE

COUNTRY PECULIAR (TRAINING)		STATION LOADING LOOKING FORWARD 									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)			DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)				SELECTIVE		EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	AUX SPNSN MAX KIAS/ MACH	FUEL TANKS MAX KIAS/ MACH	MAX KIAS/ MACH		
400.01.												CAPTIVE			TGT POD SEPARATION							
SECAPEM-90B	1	⊠		CBL	TGT	300 OPT				⊠	350 0.7	3.0 0	2.5 0	III	250 MAX/ ALT 25,000	1.0	0/0	NA	350 0.7	300 0.7	113 4353	400.01.2
															STA 3 CBL POD 300 0.7 MAX/ ALT 10,000							

REMARKS:

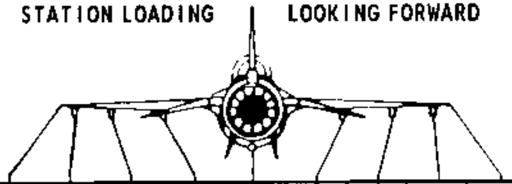
1. Line 400.01.1 is for Captive Carriage and employment of the SECAPEM-90B System only. Employment of the target pod is defined as separation of the target pod from the aircraft. REVERT TO LINE 400.01.2 IMMEDIATELY UPON EMPLOYMENT OF THE TARGET.
2. Empty wing weapon pylons are optional at station 6 and/or 7.

WARNING

Do not jettison the cable pod prior to release or jettison of the target pod. Tow characteristics of the cable pod, structural strength of the target pod with cable pod in tow, and separation characteristics of the target pod with cable pod in tow are unknown.

Figure 5-10. (Sheet 58)

Stores Limitations – BE



COUNTRY PECULIAR (TRAINING) GP/STORE	LINE	STATION LOADING — LOOKING FORWARD 1	2	3	4	5	6	7	8	9	CARRIAGE MAX KIAS/MACH	CARRIAGE MAX ACCEL G (1) SYM +/−	CARRIAGE MAX ACCEL G (1) ROLL +/−	CARRIAGE LOADING CATEGORY (10) (11)	EMPLOYMENT OR SELECTIVE JETTISON MAX KIAS/MACH	EMPLOYMENT OR SELECTIVE JETTISON MAX ACCEL G	EMPLOYMENT OR SELECTIVE JETTISON CLIMB/DIVE ANGLE-DEGREES	JETTISON (4) (20) SELECTIVE AUX SPNSN MAX KIAS/MACH	JETTISON (4) (20) SELECTIVE FUEL TANKS MAX KIAS/MACH	JETTISON (4) (20) EMERGENCY MAX KIAS/MACH	DRAG INDEX/CONFIG WEIGHT (2)	REVERT TO LINE (3)
400.01. SECAPEM-90B	2	⊗		CBL	▯	300 OPT				⊗	420 0.82 AFTER CABLE RELEASE 500 0.9	TOWING 5.5 -1	TOWING 4.0 0	III	CABLE RELEASE 250 MAX/ ALT 1000 STA 3 CBL POD 300 MAX ALT 10,000	1.0	0/0	NA	420 0.82	300 0.7	TOWING 258 4353 AFTER CABLE RELEASE 101 4150	-

REMARKS:

1. Line 400.01.2 is for towing, cable release, and flight after cable release of the SECAPEM-90B System only.
2. Empty weapon pylons are optional at station 6 and/or 7. Cable release is defined as separation of the tow cable from the cable pod.
3. The carriage limits after cable release are the same as before cable release.

WARNING

- Aircrew ejection with target in tow is not recommended as collision between aircrew and cable/target may occur. Recommend release of cable or jettison of cable pod prior to ejection.
- Selective jettison of 300-gallon fuel tank with target in tow is not recommended as tank-target/cable collisions may occur. Cable should be released prior to jettisoning fuel tank.

WARNING

Selective jettison of the cable pod with target in tow is recommended only if primary and secondary cable release mechanisms fail.

CAUTION

When towing, max acceleration and max bank angle are restricted for turns away from the side the target is towed from (i.e., right turn when towed from station 3). Restrictions are:

- 45° degrees of bank angle and 2.0g.
- No climbing or descending turns.

Figure 5-10. (Sheet 59)

Stores Limitations

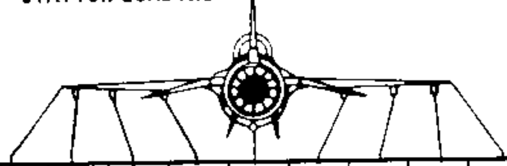
BOMBS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)		DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOAD-ING CATE-GORY (10) (11)				SELECTIVE FUEL TANKS	EMER-GENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	MAX KIAS/ MACH	MAX KIAS/ MACH		
500.01. B57	1	⊠				●				⊠	650 1.6	5.5 -2	4.4 -1	I	650 See Remark 2	0.5 TO 5.0	45/30	NA	Same as employ-ment	16 1020	20.01.1
	2	⊠				●		8		⊠				III						49 1860	20.01.2
	3	⊠			(370)	●	(370)			⊠	600 1.6			II [1]	600 See Remark 2			550 0.9 (5)	300 0.7	61 6730	20.01.28
	4	⊠			(370)	●	(370)	8		⊠										101 7570	20.01.29
	5	⊠			●	8 OPT	● OPT			⊠	550 1.6			III	550 See Remark 2			NA	Same as employ-ment	71 2502	20.01.3
	6	⊠			●	(300)	● OPT			⊠								550 0.9	550 0.9	80 4355	20.01.16
	7	⊠			●	(300)		8		⊠										89 4425	20.01.17

REMARKS:

1. Air Force approval required for jettison.
2. B57 employment and jettison is limited to a maximum altitude of:
   A. Lines 500.01.1 – 500.01.4: 16,000 feet MSL.
   B. Lines 500.01.5 – 500.01.7: 15,000 feet MSL.
3. Selective and emergency jettison can only be accomplished using normal SMS release procedures for nuclear bombs including nuclear consent and rack unlock.

Figure 5-10. (Sheet 60)

Stores Limitations

BOMBS		STATION LOADING LOOKING FORWARD 									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)		DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOADING CATEGORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE FUEL TANKS MAX KIAS/ MACH	EMERGENCY MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—								
500.01. B57	8	⊗		●				8		⊗	550 2.0	6.0 -2	5.0 -1	III	500 See Remark 2	0.5 TO 5.0	45/30	NA	Same as employment	57 1949	20.01.15
	9	⊗		●		(300)		8		⊗								550 0.9	550 0.9	86 4425	20.01.18
	10	⊗		●	(370)	(300) OPT	(370)	8		⊗	550 1.6	5.5 (6.0) -2	4.4 (5.0) -1					STA 5 500 0.9 STA 4 & 6 475 0.8	300 0.7	151 10,135	20.01.41
	11	⊗		●		8		● OPT		⊗	550 2.0	6.0 -2	5.0 -1					NA	Same as employment	69 2503	20.01.5
	12	⊗		●		(300)		● OPT		⊗								550 0.9	550 0.9	76 4356	20.01.20
	13	⊗		●	(370)	8 OPT	(370)	● OPT		⊗	550 1.6	5.5 (6.0) -2	4.4 (5.0) -1					550 0.9 (5)	300 0.7	130 8213	20.01.31

REMARKS:

1. Air Force approval required for jettison.
2. B57 employment and jettison is limited to a maximum altitude of 15,000 feet MSL.
3. Selective and emergency jettison can only be accomplished using normal SMS release procedures for nuclear bombs, including nuclear consent and rack unlock.
4. Lines 500.01.8 – 500.01.10: With AN/ALQ-119-15 ECM Pod and one or both wing-tip launchers empty, low level limited amplitude oscillations may occur above 400 KIAS.
5. Empty weapon pylons are optional at stations 4 and 6.
6. Lines 500.01.11 – 500.01.13: Without OPT store loaded at station 7, apply asymmetric store limits, figure 5-9, when REVERT TO LINE is used.

Figure 5-10. (Sheet 61)

Stores Limitations

BOMBS		STATION LOADING — LOOKING FORWARD 									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)		DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOAD-ING CATE-GORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE FUEL TANKS MAX KIAS/ MACH	EMER-GENCY MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—								
500.01. B57	14	⊠		●	(370)	(300)	(370)	● OPT		⊠	550 1.6	5.5 (6.0) -2	4.4 (5.0) -1	III	550 See Remark 2	0.5 TO 5.0	45/30	STA 5 500 0.9 STA 4 & 6 475 0.8	300 0.7	141 10,066	20.01.38

REMARKS:

1. Air Force approval required for jettison.
2. B57 employment and jettison is limited to a maximum altitude of 15,000 feet MSL.
3. Selective and emergency jettison can only be accomplished using normal SMS release procedures for nuclear bombs, including nuclear consent and rack unlock.
4. Line 500.01.14: Without OPT store loaded at station 7, apply asymmetric store limits, figure 5-9, when REVERT TO LINE is used.

Figure 5-10. (Sheet 62)

Stores Limitations

BOMBS		STATION LOADING LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)		DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1)		LOAD-ING CATE-GORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE FUEL TANKS MAX KIAS/ MACH	EMER-GENCY MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—								
500.02. BDU-38 OR B61	1	⊠				●				⊠	700 2.0	5.5 -2	4.4 -1	I	700 See Remark 2	0.8 TO 5.0	45/30	NA	Same as employ-ment	15 1226	20.01.1
	2	⊠				●		8		⊠				III						48 2066	20.01.2
	3	⊠			(370)	●	(370)			⊠	600 1.6			II [I]	600 See Remark 2			550 0.9 (5)	300 0.7	60 6936	20.01.28
	4	⊠			(370)	●	(370)	8		⊠				III						100 7776	20.01.29
	5	⊠			●	8 OPT	● OPT			⊠	650 2.0	6.0 -2	5.0 -1		650 See Remark 2			NA	Same as employ-ment	63 2914	20.01.3
	6	⊠			●	(300)	● OPT			⊠	600 1.6	5.5 (6.0) -2	4.4 (5.0) -1		600 See Remark 2			550 0.9	550 0.9	70 4767	20.01.16
	7	⊠			●	(300)		8		⊠										83 4631	20.01.17

REMARKS:

1. Air Force approval required for jettison.
2. B61 employment and jettison is limited to a maximum altitude of:
   A. Lines 500.02.1 – 500.02.4: 16,000 feet MSL.
   B. Lines 500.02.5 – 500.02.7: 15,000 feet MSL.
3. Selective and emergency jettison can only be accomplished using normal SMS release procedures for nuclear bombs, including nuclear consent and rack unlock.

Figure 5-10. (Sheet 63)

Stores Limitations

BOMBS		STATION LOADING LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON 4 20		DRAG INDEX/ CONFIG WEIGHT 2	REVERT TO LINE 3
											MAX KIAS/ MACH	MAX ACCEL G 1		LOADING CATEGORY 10 11				SELECTIVE FUEL TANKS	EMERGENCY		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9		SYM +/—	ROLL +/—		MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	MAX KIAS/ MACH	MAX KIAS/ MACH		
500.02. BDU-38 OR B61	8	⊠		●				8 -17 -131		⊠	650 2.0 See Remark 4	6.0 -2	5.0 -1	III	650 See Remarks 2 & 4	0.5 TO 5.0	45/30	NA	Same as employment	56 1981	20.01.15
	9	⊠		●		300		8 -17 -131		⊠	600 1.6 See Remark 4				600 See Remarks 2 & 4			550 0.9	550 0.9 See Remark 4	85 4457	20.01.18
	10	⊠		●	370	300 OPT	370	8 -17 -131		⊠		5.5 (6.0) -2	4.4 (5.0) -1					STA 5 500 0.9 STA 4 & 6 475 0.8	300 0.7	150 10,167	20.01.41

REMARKS:

1. Air Force approval required for jettison.
2. B61 employment and jettison is limited to a maximum altitude of 15,000 feet MSL.
3. Selective and emergency jettison can only be accomplished using normal SMS release procedures for nuclear bombs, including nuclear consent and rack unlock.
4. When one or both wingtip launchers are empty and store is present at stations 3 and 7:
   a. Low level limited amplitude oscillations may occur above 400 KIAS.
   b. BDU-38 and B61 carriage, employment, and jettison limited to 0.9 mach.
5. AIM-9 employment restricted to the specific weapon carriage restrictions specified in Remark 2.
6. Empty weapon pylons are optional at stations 4 and 6.
7. AN/ALQ-119-15 is not authorized with these configurations.
8. -17 ECM pod used for DRAG INDEX/CONFIG WEIGHT.

Figure 5-10. (Sheet 64)

Stores Limitations

BOMBS		STATION LOADING — LOOKING FORWARD									CARRIAGE				EMPLOYMENT OR SELECTIVE JETTISON			JETTISON (4) (20)		DRAG INDEX/ CONFIG WEIGHT (2)	REVERT TO LINE (3)
											MAX KIAS/ MACH	MAX ACCEL G (1) SYM +/—	MAX ACCEL G (1) ROLL +/—	LOADING CATEGORY (10) (11)	MAX KIAS/ MACH	MAX ACCEL G	CLIMB/ DIVE ANGLE-DEGREES	SELECTIVE FUEL TANKS MAX KIAS/ MACH	EMERGENCY MAX KIAS/ MACH		
GP/STORE	LINE	1	2	3	4	5	6	7	8	9											
500.02. BDU-38 OR B61	11	⊠		●		8 OPT		● OPT		⊠	650 2 See Remark 4	6.0 -2	5.0 -1	III	650 See Remarks 2 & 4	0.5 TO 5.0	45/30	NA	Same as employment	67 2914	20.01.5
	12	⊠		●		300		● OPT		⊠					600 See Remarks 2 & 4			550 0.9	550 0.9 See Remark 4	74 4767	20.01.20
	13	⊠		●	370	8 OPT	370	● OPT		⊠	600 1.6 See Remark 4	5.5 (6.0) -2	4.5 (5.0) -1					550 0.9 (5)	300 0.7	128 8624	20.01.31
	14	⊠		●	370	300	370	● OPT		⊠								STA 5 500 0.9 STA 4 & 6 475 0.8		139 10,477	20.01.38

REMARKS:

1. Air Force approval required for jettison.
2. B61 employment and jettison is limited to a maximum altitude of 15,000 feet MSL.
3. Selective and emergency jettison can only be accomplished using normal SMS release procedures for nuclear bombs, including nuclear consent and rack unlock.
4. When one or both wingtip launchers are empty and both stores are present at stations 3 and 7:
   a. Low level limited amplitude oscillations may occur above 400 KIAS.
   b. BDU-38 and B61 carriage, employment, and jettison limited to 550 KIAS for load factors less than 2g.
   c. BDU-38 and B61 carriage, employment, and jettison limited to 400 KIAS for load factors greater than 2g.
5. AIM-9 employment restricted to the specific weapon carriage restrictions specified in Remark 2.
6. Empty weapon pylons are optional at stations 4 and 6.
7. Lines 500.02.11 – 500.02.14: Without OPT store loaded at station 7, apply asymmetric store limits, figure 5-9, when REVERT TO LINE is used.

Figure 5-10. (Sheet 65)

SECTION VI
FLIGHT CHARACTERISTICS

TABLE OF CONTENTS

INTRODUCTION

Information presented in this section reflects the flight characteristics with category I, II, and III loadings. Refer to AOA AND ROLLING LIMITATIONS, Section V, for information regarding specific categories.

FLIGHT CONTROL SYSTEM

The flight control system (FLCS) is a four-channel fly-by-wire system. The flight control computer (FLCC) and electronic component assembly (ECA) combine pilot inputs along with aircraft motion and flight conditions to command position of the flight control surfaces. Artificial stability provided by the FLCS allows for relaxed static stability which increases performance and maneuverability by reducing trim drag and increasing maximum lift. Refer to Section I for a detailed system description.

FLCS LIMITERS

FLCS limiters may be defeated if maneuvering limits are not strictly observed. Departure may result from maximum maneuvering combined with maximum permissible aft CG. The most critical maneuvers are maximum command rolls coupled with either maximum aft stick or exceeding the maximum bank angle change limits.

The AOA/g limiter depends on the horizontal tails to control g and AOA. If the airspeed decreases until there is not enough airflow over the tail to provide sufficient control power, the limiter will be defeated and a departure or deep stall may result. This condition may occur in a nose-high, decreasing speed maneuver. Refer to LOW AIRSPEED OPERATING LIMITATIONS, Section V.

LEADING EDGE FLAPS

The LEF's system is designed to optimize wing airflow. It also provides special functions in the takeoff and landing configurations.

At subsonic speeds, the LEF's move from 2 degrees up to 25 degrees down as a function of mach number, AOA, and altitude. This automatic operation significantly reduces buffet and drag and improves high AOA directional stability. If the LEF's fail to schedule properly during maneuvering flight, higher than normal buffet levels will occur and, in the high AOA region, reduced directional and longitudinal stability may also be noted. At supersonic speeds, the LEF's are scheduled to minimize drag.

NOTE

> The LE FLAPS caution light may illuminate during maneuvering flight at approximately 1.0 mach at 20,000 feet MSL or greater. The caution light should be reset at an airspeed other than 1.0 mach.

SPEEDBRAKES

The speedbrakes provide deceleration over the entire flight envelope. There are no trim changes associated with speedbrake operation and induced buffet is negligible. A 1g yaw oscillation may occur at approximately 1.4 mach with speedbrakes opened. The oscillations are neutrally damped and no action is required. The oscillation may be eliminated by either closing the speedbrakes, reducing mach, or increasing the g level.

AUTOPILOT

If the ALT HOLD remains engaged as airspeed transits 1.0 mach, a mild pitch transient may occur and can be eliminated by depressing the paddle switch until the altimeter has stabilized.

WARNING

Use of ALT HOLD during decelerating flight can produce a descent from the referenced altitude if AOA increases above a certain value. This value assumes that the pitch trim is centered. Any use of nosedown trim will reduce net autopilot authority and allow descent to occur at lower AOA's. Depending on thrust setting, high rates of descent can develop. With the STORES CONFIG switch in CAT I, the aircraft will start descending from the referenced altitude at approximately 16-19 degrees AOA and in CAT III at approximately 8-10 degrees AOA.

TRIM

The aircraft can be trimmed about all three axes. With pitch trim centered in cruise gains and no input to the stick, the aircraft will attempt to maintain 1g flight regardless of flight condition unless AOA exceeds 15 degrees. Full noseup/full nosedown trim corresponds to +3.4g or -1.4g in cruise gains.

NOTE

Airspeed must be closely monitored because there is little aerodynamic indication of large changes in airspeed. Cues which normally indicate airspeed changes, such as stick movement or trim changes, are absent.

Above 15 degrees, the FLCS commands an increasing nosedown pitch attitude as a warning of decreasing airspeed. A specific force applied to the stick commands a specific g increment from the trim condition. Moving the pitch trim wheel changes the hands-off trim condition.

69 In takeoff and landing gains, zero pitch trim commands zero pitch rate until 10 degrees AOA. A slight amount of noseup trim is required to zero stick forces during an 11-13 degree AOA approach.

LESS 69 In takeoff and landing gains, a trim setting corresponds to a specific hands-off AOA rather than a specific g. The zero mark corresponds to 6 degrees AOA. Full noseup trim corresponds to slightly more than 13 degrees AOA. If the LG handle is lowered with the pitch trim at zero, in 1g flight, at 6 degrees AOA, no appreciable trim transient will occur. If the LG handle is lowered at a speed corresponding to less than 6 degrees AOA, a mild pitchup trim change occurs. To prevent a noseup pitch transient after takeoff or a touch-and-go landing, the pitch trim is automatically zeroed whenever MLG wheel speed exceeds 60 knots groundspeed. Since this auto retrim is not available for a low approach, be prepared to manually retrim nosedown when the LG handle is raised.

When properly trimmed and no input is applied to the stick, the aircraft attempts to maintain zero roll rate. Moving the roll trim wheel changes the hands-off trim condition. Maximum roll trim authority is approximately one-fifth of maximum stick command of cruise gains. However, precise trimming is difficult using the stick trim button. Roll trim requirements may change with stores, particularly at supersonic speeds. For asymmetric configurations (asymmetrical stores or rudder mistrim), roll retrimming may be required as flight conditions change. Roll trim inputs also command rudder deflection through the ARI. The ARI switches out with wheel spin-up upon landing. Likewise, the ARI switches in following takeoff as the wheels spin down. This switching may cause abrupt rudder inputs to occur if roll (due to asymmetries or crosswind) is being input via the stick or trim.

Rudder trim inputs command rudder deflection. Rudder trim is required with asymmetrical configurations and frequently during supersonic flight, especially with stores. Maximum trim authority is 12 degrees.

FACTORS AFFECTING FLYING CHARACTERISTICS

NOTE

70 A mild oscillation (3 cycles per second) may occur at 0.75-0.90 mach. The oscillation is caused by the normal response of the aircraft/control system. The oscillation is most likely to occur with a clean aircraft and autopilot in ALT HOLD. The oscillation does not cause a significant tracking problem.

CENTER-OF-GRAVITY CONSIDERATIONS

Monitoring the forward and aft fuel distribution provides an indication of the aircraft CG.

As CG moves aft, higher pitch rates are obtainable and susceptibility to departure and deep stall increases.

NOTE

[A] The most aft CG occurs with approximately 2000 pounds of internal fuel remaining.

[B] With external fuel tanks, the most aft CG occurs when the external tanks have just emptied.

EFFECT OF THRUST

Thrust changes result in little or no change in aircraft trim or stability at all operational load factors and for all store loadings.

FLIGHT WITH STORES

The major effects of stores are increased weight and inertia. A reduction in aircraft response and damping should be expected as GW increases particularly when stores are carried. Stores generally reduce longitudinal and directional stability and increase inertial effects so that the pilot must anticipate initiation and termination of maneuvers based on the loadings. High roll and pitch rates are attainable with full force application of the stick. Avoid abrupt control inputs which may cause AOA overshoots in excess of the limitations specified in Section V.

Bank angle change limits must not be exceeded. During rolling maneuvers with category III loadings, the roll rate must be stopped prior to (47) 360-degree, **LESS** (47) 180-degree bank angle change. Removing the roll input is not always sufficient (opposite stick may be required). Refer to STORES LIMITATIONS, Section V, for store restrictions. Certain store loadings may exhibit decreased yaw/roll damping in supersonic flight and result in mild yawing oscillations. Additionally, buffeting may occur in transonic flight with certain store loadings. The oscillations and buffeting are not dangerous and no action is required.

STORE SEPARATION

Symmetrical store releases and wingtip AIM-9 missile launches can be accomplished with no unusual aircraft responses. Separation of the 300-gallon centerline tank produces negative g on the aircraft. The magnitude of this response depends on the amount of fuel remaining in the tank and the mach number at release. Separating a full centerline fuel tank at supersonic speeds produces the worst response (up to –1.5g).

Separation of 370-gallon tanks produces a minimal aircraft response. Separation of a single 370-gallon tank will initially produce aircraft positive g response and roll away from the separated tank (up to +1g and 15 degrees of bank).

NORMAL FLIGHT CHARACTERISTICS

The FLCS provides constant response for specific inputs regardless of flight conditions. Commanded pitch responses are in g increments per stick force for AOA below 15 degrees. Above 15 degrees AOA, stick force increases as a cue of increasing AOA. The commanded lateral response is roll rate per stick force. Rudder position is commanded by rudder pedal force.

CATEGORY I LOADINGS

The FLCS minimizes the possibility of departures or spins. Roll rate inputs command flaperons and horizontal tails for roll power to provide a relatively constant roll response.

NOTE

Roll ratcheting may be experienced during rolls where less than full stick inputs are commanded.

Maximum command 360-degree rolls at subsonic speeds may cause a slight g reduction on termination. At supersonic speeds, maximum roll rates may cause a slight increase in g. At high AOA and low airspeed conditions, roll performance is reduced by the FLCS to minimize pitch/roll coupling. Aft CG's, open speedbrakes, asymmetric missiles, or centerline stores decrease departure resistance.

Use of rudder pedal inputs for roll coordination is not desirable. The ARI provides coordinated rudder commands and reduces sideslip during rolling maneuvers. Rudder inputs do not improve roll performance but do increase departure susceptibility.

WARNING

Rolling g limits are not protected by the FLCS and must be observed.

The FLCS requires adequate airflow over control surfaces to be effective. Critically low airspeeds should be avoided. ((37) The low speed warning tone sounds to aid in avoiding critical flight conditions.)

To recover from a high pitch attitude, unload the aircraft and roll toward the nearest horizon. Terminate the roll when wings are level and then move the nose to the horizon with a smooth application of full

aft stick pressure. Make smooth lateral inputs only as required to maintain wings level. At low airspeeds during a high pitch attitude recovery, the aircraft pitch rate may slow down markedly as the AOA/g limiter tries to limit the AOA. If full aft stick pressure is released or if recovery is initiated below Section V limits, avoid abrupt pitch inputs. Use minimum stick force necessary to keep the nose moving toward the horizon. Below recommended minimum recovery airspeeds, abrupt inputs generate increasing AOA leading to departure because there is insufficient airflow over the tail to overcome inertia. Forward stick force may be required to prevent overshoot as the nose approaches the vertical (-90 degrees pitch) during recovery. After attaining an aircraft nosedown attitude, allow airspeed to increase to 200 knots, if feasible, before attempting recovery to level flight.

WARNING

- Prior to low speed, high AOA maneuvers at or near AOA limiter, insure lateral fuel asymmetry is less than 200 pounds.
- FLCS limiters may be defeated at low airspeed (below 200 knots) during maximum pitch or roll rates initiated from below limiter AOA's. The aircraft should be flown smoothly to the AOA/g limiter during low airspeed situations to prevent departures.

CATEGORY II LOADINGS LESS 47

Category II loadings increase departure susceptibility to pitch/roll coupling and rudder inputs during rolling maneuvers; however, flight characteristics are not seriously affected. Structural overstress must still be avoided. With STORES CONFIG switch in CAT I, requirements to adhere to category II limits increase workload. With STORES CONFIG switch in CAT III, workload is significantly reduced, but aircraft performance is also reduced to category III limits. In CAT III position, category II loadings may be flown symmetrically to the AOA limiter, and max command 360-degree rolls may also be performed to the AOA limiter.

CATEGORY III LOADINGS

Aircraft response with most category III loadings remains similar to that of the clean aircraft; however, large stores significantly increase total aircraft drag and reduce performance. Light buffeting may occur during level flight at approximately 0.92 mach. In addition, surging may occur near the store limit airspeed, especially at low altitude. Neither condition requires specific action.

During loaded g wing rock rolling maneuvers or climbing turns, for example, airspeed decreases and AOA increases more rapidly. Conventional cues such as aircraft buffeting or increasing stick forces are not always present as AOA and g limits are approached.

Rudder inputs during rolling maneuvers increase departure susceptibility. With STORES CONFIG switch in CAT I, category III loadings are not protected from AOA or roll-induced departures. Requirements to adhere to category III limits increase workload. Departures may result from exceeding AOA limits either during symmetrical maneuvers such as a pullout from a weapons delivery pass or during rolling maneuvers such as a loaded g reversal or a loaded roll-in for a weapons delivery pass.

With STORES CONFIG switch in CAT III, the AOA/g limiter provides departure resistance for all category loadings. Except for the requirement to avoid structural overstress, pilot workload is reduced to a level comparable to that with category I loadings.

ASYMMETRIC LOADINGS

If roll trim is used to hold up a heavy wing, the ARI adds rudder in the direction of the roll trim, causing a yaw away from the heavy wing. If roll trim is used for takeoff, yaw will occur when the wheel speed drops below 60 knots groundspeed after takeoff, activating the ARI. This yaw is easily controllable by rudder inputs. Yaw and roll trim requirements will change for different flight conditions.

Asymmetric loads increase departure and spin susceptibility. Roll inputs/trim away from the heavy wing are required to maintain the desired roll attitude. Increasing g requires additional roll inputs/trim. Therefore, aft stick inputs result in increased roll requirements which, in turn, will produce yaw away from the heavy wing due to ARI action.

WARNING

With certain asymmetric category III loadings (2000 pounds or higher on station 3 or 7 with stores on stations 4, 6, and/or 5), rapid or abrupt aft stick inputs may result in sudden nose slicing departures.

WARNING

Departure with an asymmetric category III loading may result in a fast, flat (possibly nonrecoverable) spin.

At high airspeeds, asymmetric loads exhibit some unusual flight characteristics. Frequent trim reversals may occur during supersonic acceleration. At airspeeds greater than 700 knots, yaw oscillation may occur with significant lateral accelerations. Over 750 knots, a high frequency directional shaking may occur with loadings such as the ECM pod.

FLIGHT WITH LG DOWN

With the LG handle down, LG and TEF's will be extended and the FLCS will operate in takeoff and landing gains. Normally, this mode of flight is limited to takeoff, approach, and landing; however, circumstances can arise which require flight for an extended distance with the LG down. If so, the LG should be left pinned but the streamers should be removed to prevent damage.

With the LG pins left installed, it is preferable to raise the LG handle once airborne. This will retract the TEF's and significantly reduce drag and the FLCS will switch to cruise gains. For cruise with only the LG down, the best airspeed is 230-250 knots. A clean aircraft can be flown at 25,000-30,000 feet with the LG down and TEF's up and fuel flow will be 3000-3400 pph. If the LG handle is left down, the TEF's will remain down and the best cruise altitude will be less than 20,000 feet with significantly higher fuel flows.

LANDING CONFIGURATION

Two distinct techniques may be used when landing. The first requires trimming to approximately 13 degrees AOA and maintaining that AOA throughout the final turn and final approach to touchdown. The throttle is used to maintain glidepath, and stick inputs primarily control direction through bank angle. As the aircraft nears touchdown, retard throttle to IDLE. If the aircraft bounces as the MLG struts recoil from landing, maintain 13 degrees or less pitch attitude throughout the bounce. The second technique requires trimming to approximately 11 degrees AOA and maintaining that AOA throughout the final approach. Attitude/glidepath is controlled by the stick. Airspeed/AOA is controlled by the throttle. As the aircraft nears touchdown, retard throttle to IDLE and increase pitch attitude to 13 degrees AOA.

The 13-degree AOA approach allows a slower approach speed, better control at touchdown, and more efficient energy dissipation, particularly if combined with a steeper glidepath. The 11-degree AOA approach allows improved pitch control, improved over-the-nose visibility, and more stable HUD symbology within the field of view. In gusty conditions, the aircraft wallows less at 11 degrees AOA than at 13 degrees AOA.

Regardless of technique used, the desired airspeed and AOA should be established early on final. Small throttle adjustments may be required as the EEC retrims the engine. On short final, avoid premature or large thrust reductions which may cause increased sink rates. Use thrust rather than back stick to control undesirable sink rates. Increased back stick may result in a tail strike in this situation. AOA decreases slightly as the aircraft enters ground effect. All normal landings should be made with speedbrakes opened to the 43-degree position to avoid a floating tendency when entering ground effect.

Increased control inputs to achieve normal aircraft response as airspeed decreases are unnecessary. Control inputs should be kept small to avoid overcontrol.

Due to the aircraft light wing loading and the floating tendency associated with ground effect, wake turbulence on final approach and during touchdown presents a significant hazard. Increased spacing between landing aircraft should be used when there is little or no effective crosswind. Exercise caution and be ready to initiate a go-around when wake turbulence is encountered. Avoid large, rapid roll control inputs which decrease lift and may increase the sink rate. Roll commands retract the corresponding flaperon which decreases lift and may cause the aircraft to sink as well as roll.

(69) The FLCS pitch axis provides the following flight characteristics:

- Increased stability in gusty wind conditions.
- Reduced pilot workload during landing.
- Increased pitch stability during aerodynamic braking.
- Reduced (or no) transients during LG operation.

If pitch trim is used during the turn to final, forward stick/trim will be required upon rollout on final approach to counter nose up motion. Floating tendencies following a high flare or aircraft bounce may

be increased. Slight forward stick force may be required to prevent a long or slow landing. Stick force per degree AOA change is reduced and should not be relied upon as a slow speed cue.

OUT-OF-CONTROL CHARACTERISTICS

YAW DEPARTURE

A yaw departure may occur with a 300-gallon fuel tank loaded during max command rolls on the CAT I AOA limiter at high altitude. Yaw departures are characterized by an abrupt increase in adverse yaw and associated sideforce when a roll is initiated. The yaw may be 20 degrees or higher. Initially, the aircraft rolls in the direction commanded. However, roll rate quickly decreases to near zero or even reverses in response to the large sideslip angles. (In a normal roll, adverse yaw usually develops and slows the increase of roll rate. In some cases, normal adverse yaw may actually cause the roll rate to decrease slightly, but not to the degree caused by a yaw departure.)

Several factors increase the probability of a yaw departure with a 300-gallon fuel tank loaded. Yaw departures result only from rolls initiated to the left which is probably due to engine gyroscopic effect. The carriage of missiles, suspension equipment, or external fuel tanks causes directional stability at the AOA limiter to decrease and thus increases the chance of a yaw departure. Between 0.8-0.95 mach, directional stability also decreases. Increasing altitude (above approximately 25,000 feet) increases the probability of a yaw departure because of the unfavorable combination of increased altitude and lower airspeed. Above 35,000 feet, all 300-gallon fuel tank loadings can experience yaw departures from CAT I AOA limiter rolls initiated at high subsonic mach numbers.

Yaw departure with CAT I 300-gallon fuel tank loadings can be minimized primarily by pilot awareness. The worst case maneuver is a maximum command roll when operating on or near the AOA limiter particularly at high altitude and when the aircraft is configured with wing stores. To prevent yaw departures, either unload the aircraft or command lower roll rates. Yaw departures may also be avoided by electing to manuever the aircraft with STORES CONFIG switch in CAT III. A yaw departure may transition into a pitch departure.

PITCH DEPARTURE

Above 25 degrees AOA, both horizontal tails are commanded to full trailing edge down by the AOA limiter. AOA overshoots above 25 degrees may occur without being noticed. At 29 degrees AOA and above, the yaw rate limiter cuts out stick roll inputs and provides antispin control inputs.

47 The AOA limiting function of the FLCS provides departure resistance with category I and III loadings when the STORES CONFIG switch is properly positioned.

LESS 47 The AOA limiting function of the FLCS provides departure resistance with category I loadings and with category II or III loadings when the STORES CONFIG switch is in CAT III.

However, a pitch departure can occur during high pitch attitude climbs in which recovery is initiated below minimum airspeeds or during high AOA maximum command rolls with CG near the aft limit. LESS 47 Refer to FUEL MANAGEMENT, Section II.

Use of the speedbrakes at high AOA reduces departure resistance. Observing the AOA, airspeed, and bank angle limitations of Section V normally prevents departure. A positive AOA departure often is self-recovering, consisting purely of an AOA overshoot above 25 degrees normally with little or no yaw or roll rates. However, stores reduce directional stability and may cause significant yaw excursions above 25 degrees AOA. A positive AOA departure may result in any of the following:

- A self-recovering poststall gyration with abrupt random pitch, yaw, and roll rates.
- An upright deep stall.
- An upright spin (with large store asymmetry).

A negative AOA departure may occur if negative AOA significantly exceeds that allowed by the AOA/g limiter. Such a condition can occur if the aircraft is flown near zero airspeed at high pitch attitude and the aircraft either falls on its back or pendulums through to an inverted position. A negative AOA departure may result in the following:

- A large negative AOA with little or no yaw and roll rates. This is the most common effect of a negative AOA departure and is usually self-recovering. During the departure, the AOA indicator will be pegged at –5 degrees.
- An inverted deep stall.
- An inverted spin. This will occur if roll and yaw controls are not neutralized following departure or if a large asymmetry exists.

Stores and aft CG's generally degrade aircraft stability and control, making aircraft motion more pronounced about all three axes during departure.

DEEP STALLS

A deep stall has occurred when AOA stabilizes at a high positive or negative value and full horizontal tail deflection is insufficient to reduce AOA. At the deep stall AOA, which is well outside the FLCS limiters, the FLCS has positioned the horizontal tail at full deflection to reduce AOA.

Aircraft susceptibility to a deep stall and flight characteristics during a deep stall depend on aircraft CG and stores configuration. When CG is far enough forward, the aircraft may self-recover and not enter a deep stall. As CG moves aft, entry into stable deep stalls becomes possible. With further aft CG, the aircraft motion during a deep stall becomes more oscillatory. During oscillatory deep stalls, the pitch attitude may oscillate ±30 degrees about a point near the horizon reversing direction every few seconds. Roll and yaw may also be highly oscillatory. Oscillatory deep stalls are more difficult to recognize than stable deep stalls because of the misleading appearance of recovery as the nose oscillates below the horizon.

An upright or positive AOA deep stall is characterized by a load factor of 1g and a large positive AOA of approximately 60 degrees. Except for possible momentary decreases, the AOA indicator will read approximately 32 degrees. The aircraft may exhibit pitch and roll oscillations and may also rotate slowly in yaw. To prevent a spin, the yaw rate limiter provides roll and yaw inputs to oppose the aircraft rotation. Although entry into an upright deep stall can occur at nearly any aircraft attitude, the aircraft will transition to a near wings-level condition with the nose near the horizon.

An inverted or negative AOA deep stall is characterized by a load factor of –1g and a large negative AOA of approximately –60 degrees. The AOA indicator will be pegged at –5 degrees. The aircraft will generally be stable in roll but may oscillate in pitch. Very little yaw rate is evident unless roll or yaw controls are applied. There is no yaw rate limiter for an inverted deep stall so the pilot controls the flaperons and rudder.

In both the upright and inverted deep stall, airspeed indications are erroneous and will oscillate between the minimum value of the indicator and as high as 150 knots. Sink rate is from 10,000-15,000 feet per minute. Altimeter indications are reliable.

SPINS

A spin is a poststall gyration typified by a continuous yaw rate in one direction. AOA and airspeed indications and sink rates during upright and inverted spins are similar to those during upright and inverted deep stalls.

An upright spin is characterized by a very slow yaw rate and one turn per each 10-15 seconds. Load factor is 1g and the nominal position of the aircraft nose is slightly below the horizon. Significant pitch oscillations are usually evident. The yaw rate limiter will generally stop the yaw rotation within two turns, but an upright deep stall condition may then exist. Rapidly increasing yaw rates and entry into a fast, flat (and possibly unrecoverable) upright spin may be possible following a departure from controlled flight with asymmetric stores loadings.

An inverted spin is characterized by an inverted attitude, a load factor of −1g, and a nominal position of the aircraft nose slightly below the horizon. A slow yaw rotation and significant pitch oscillations are typical. A fast, flat inverted spin is possible if roll and yaw controls are not neutralized following a negative AOA departure from controlled flight or if a large lateral asymmetry exists.

RECOVERIES

Yaw Departure

If a yaw departure is experienced, release the stick to cancel the roll command and to lower the AOA (and thus increase the directional stability). Undesired rolls may occur at this point because of the large sideslip angle remaining at the time that the roll command is removed. The aircraft will then normally return to controlled flight if the AOA is less than 32 degrees. It may, however, lead to a pitch departure.

Pitch Departure

Pitch departure recoveries are generally characterized by the nose pitching down to a steep dive angle, increasing airspeed, and AOA returning to a normal range −5 to +25 degrees AOA. Characteristics vary according to the type of departure situation (departure, deep stall/spin) and recovery procedures used. As the aircraft reenters normal AOA range, allow airspeed to increase to 200 knots or more, if altitude permits, to prevent possible reentry into departure during recovery. If a roll is commanded as AOA decreases below 29 degrees, the aircraft may roll-couple and reenter departure.

Deep Stall/Spin

The aircraft can be rocked out of a deep stall. With the MPO switch held in OVRD, the horizontal tails position can be controlled. The horizontal tails cannot reduce AOA but can increase it in a deep stall. If AOA is increased and then the stick is pushed full forward (upright) or aft (inverted), a pitch rate may be generated in the proper direction to break the deep stall. This pitch rate can force the aircraft through the deep stall to an AOA where the horizontal tail has enough power to control AOA and recover the aircraft. The initial pitch input should increase pitch attitude approximately 20 degrees. If not, continue to apply stick inputs in phase with existing pitch oscillations. This should increase nose oscillations enough to effect recovery.

ENGINE OPERATION DURING DEPARTURES/OUT OF CONTROL

Departures at high altitude may result in an engine stall or stagnation. The maximum engine stall margin is maintained at MIL. If the AB is operating during departure, it may blow out and try to relight, causing a stall/stagnation. Therefore, if altitude is not critical, the throttle should be retarded to MIL. If the engine stalls or stagnates in MIL, the throttle should be retarded to IDLE. If the engine stagnates, it must be shut down and restarted. However, concentrate on recovery from the out-of-control condition prior to shutting down the engine. If the aircraft enters a deep stall, the probability of an AB light is high once abrupt aircraft gyrations have ceased and altitude is below 20,000 feet. AB helps move the CG forward (with AFT ENG FEED selected) and decreases the sink rate.

DEGRADED FLIGHT CONTROLS

LEADING EDGE FLAPS LOCKED (SYMMETRIC)

Flight characteristics for landing and low AOA maneuvering are not significantly affected by locked LEF's. At high airspeeds, LEF's locked down cause increased buffet. At high AOA, LEF's locked up reduce stability, increase departure susceptibility significantly, and cause increased buffet. Above 16-18 degrees AOA, an abrupt yaw departure may occur, producing an uncommanded roll with little or no forewarning. Do not exceed 12 degrees AOA with the LEF's inoperative. Locked down LEF's

significantly reduce cruise range. During landing, floating may also be noticeable if LEF's are locked. The aircraft may float, sink rate may decrease, and a slight forward stick pressure may be needed to fly through the ground effect.

TRAILING EDGE FLAPS (FLAPERONS)

The flaperons function as TEF's when lowered simultaneously. The wing flap system is designed to prevent split-flap operation. If a malfunction causes either flaperon to lock, then neither TEF will lower. If the TEF's were extended at the time of the malfunction, both TEF's will retract before the malfunctioning surface is locked. The increase in descent rate associated with TEF retraction at final approach AOA is mild and easily controlled. Landing without TEF's presents no significant control problems.

LOCKED CONTROL SURFACES

Flaperon

The aircraft can be landed safely with one locked flaperon; however, there will be no TEF's available and roll control power will be significantly reduced.

Horizontal Tail

Simulator evaluation indicates that the aircraft can be landed safely with one locked horizontal tail. While pitch commands may cause a rolling tendency, flaperon authority is adequate to counteract the roll inputs.

Rudder

Simulator evaluation indicates that the aircraft can be flown and landed safely with a locked rudder.

STANDBY GAINS

When operating on standby gains, aircraft response will be normal at low AOA. Because the LEF's are at zero degrees (LG handle in UP, ALT FLAPS switch in NORM, and the AIR REFUEL switch in CLOSE) with a dual air data failure, buffet and departure susceptibility will be increased at higher AOA (above 18 degrees). At flight conditions higher/slower than the fixed gain conditions, aircraft response will be more sluggish requiring larger control inputs for a given response. Landing the aircraft should present no special problems.

ONE HYDRAULIC SYSTEM

Flight characteristics with one hydraulic system should be normal unless extremely large, rapid control surface deflections are commanded. Under these conditions, the hydraulic flow rate from the one system may be exceeded which will slow down control surface movement rates and possibly cause sluggish aircraft response.

SPEEDBRAKES

Speedbrakes may stick fully open or open asymmetrically. If a yawing moment is noted when the speedbrakes are opened, close the speedbrakes. If the speedbrakes fail to close, a significant increase in drag results. Fully opened speedbrakes significantly reduce cruise range.

DIVE RECOVERY

Dive recovery capability is given as altitude lost during pullout and is plotted as a function of pullout load factor, dive angle, and true airspeed (figure 6-1). Plots to convert indicated airspeed or mach number into true airspeed are provided on the chart. A 2-second delay in initiating pullout is built into the chart. Dive recovery capability at constant load factor is insensitive to GW and drag, but high thrust settings may increase lost altitude by a significant amount.

SAMPLE PROBLEM:

A.	KIAS	= 480
B.	Initial altitude	= 5000 feet
C.	Temperature	= 0°C
D.	KTAS	= 505
E.	Mach number	= 0.79
F.	Pullout load factor	= 5g
G.	Dive angle	= 45 degrees
H.	Altitude lost during pullout	= 2700 feet

Dive Recovery

DATA BASIS: ESTIMATED

CONDITIONS:
- IDLE THRUST
- MAXIMUM RATE PULLUP (MAXIMUM STICK)
- 2-SECOND DELAY BEFORE PULLUP INITIATION
- FULL SPEEDBRAKES

WARNING

High thrust setting (MIL or above) may increase altitude required by approximately 15 percent and 30 percent at MAX AB.

NOTE: Applicable for CAT I and CAT III Limiter

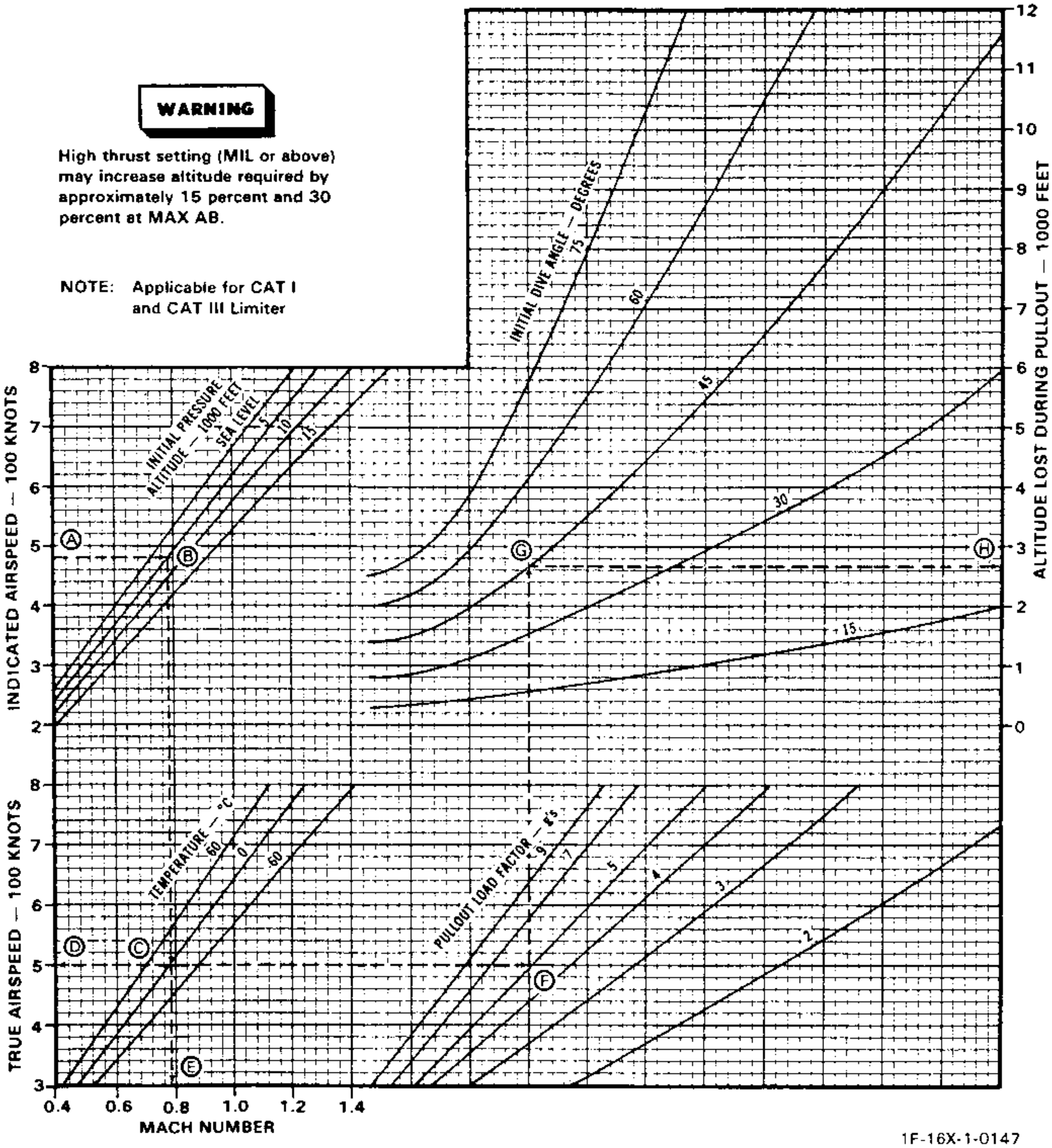


Figure 6-1.

SECTION VII
ADVERSE WEATHER OPERATION

TABLE OF CONTENTS

INTRODUCTION

This section contains information and procedures that affect operation of the aircraft in adverse weather and climatic conditions and which differ from the normal procedures in Section II.

INSTRUMENT FLIGHT PROCEDURES

WARNING

- The HUD should not be used as the sole reference for instrument flight due to the lack of adequate failure warning but should be cross-checked with the primary/basic instruments.
- It is possible for primary attitude and/or heading to be in error with no ADI OFF or AUX flags displayed. To detect such an error, basic and backup instruments must be cross-checked.

NOTE

When rotating the HSI course setting from an eight-unit digit to a nine-unit digit (e.g., 018 to 019), the tens digit may rotate prematurely causing a 10-degree reading error (e.g., 029). Cross-check counter setting with course arrow reading to insure proper course setting.

HOLDING

Holding airspeed is 200-250 knots (maximum endurance airspeed recommended).

PENETRATION

Penetrations will be flown at 300 knots, speedbrakes as required, and throttle at 70 percent rpm minimum.

INSTRUMENT PATTERN/APPROACHES

Instrument patterns will be flown at 200-250 knots clean. Approaching final, lower the LG, slow the aircraft, and fly final approach at 13 degrees AOA maximum. Figure 7-1 shows a typical TACAN approach, and figure 7-2 shows a typical GCA.

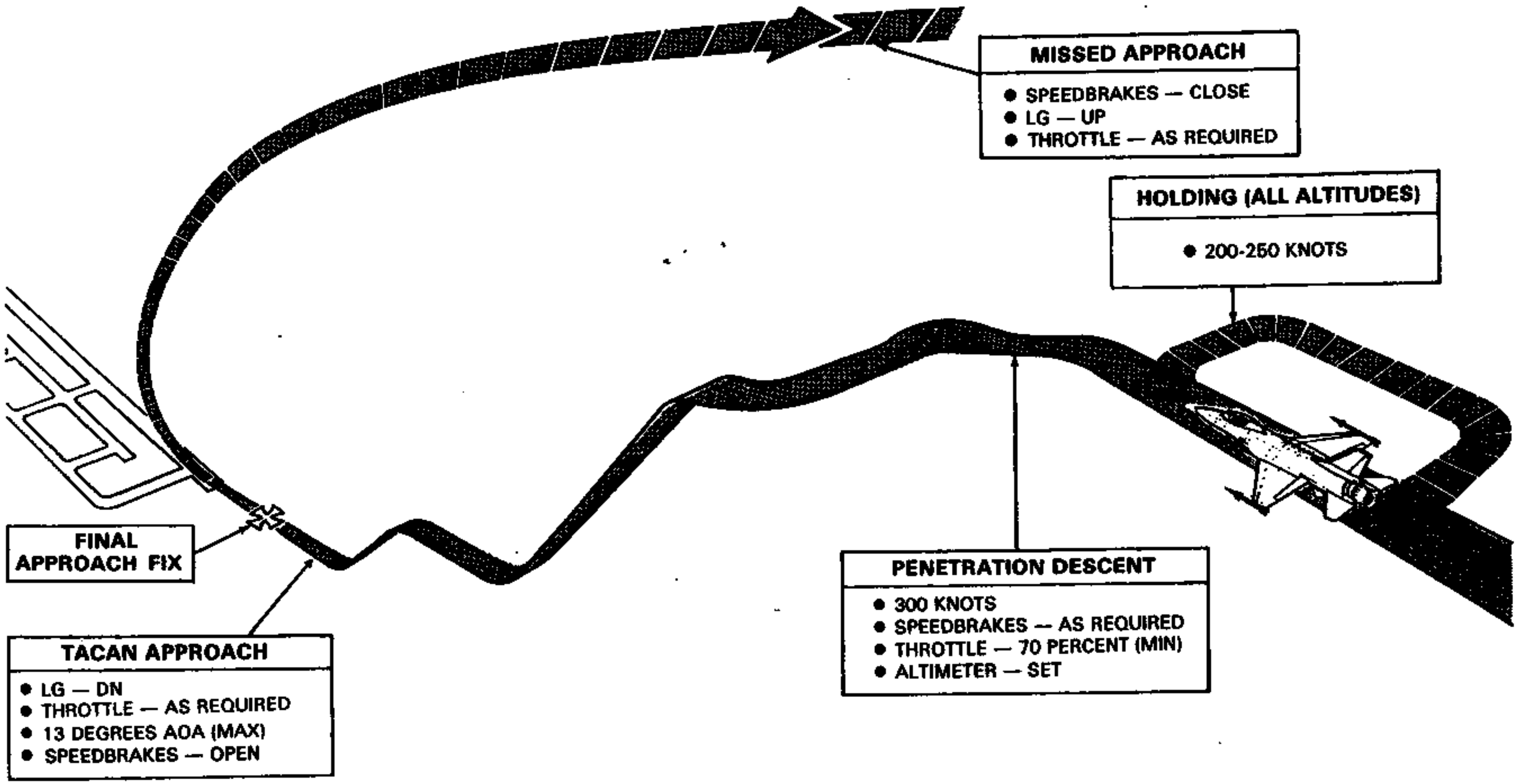
MISSED APPROACH

Advance throttle as required and close speedbrakes. Retract LG when a positive climb is established. Pitch transients resulting from LG and TEF's changes are mild and require minimum control compensation **LESS** 69 except during low approach when touchdown and auto retrim have not occurred. Anticipate the requirement for nosedown pitch trim when the LG handle is raised especially during formation missed approaches.

TURBULENCE AND THUNDERSTORMS

Avoid flight in turbulent air, hailstorms, and thunderstorms. There is a high probability of damage to airframe and components from impact ice, hail, and lightning. Thunderstorm penetration airspeed is 300 knots or optimum cruise airspeed, whichever is lower. At high airspeeds, personal discomfort and structural stress are greater. At slower airspeeds, controllability is reduced and inlet airflow distortion due to turbulence may cause compressor stall and/or engine stagnation.

Tacan Holding, Penetration and Approach (Typical)



NOTE: A typical straight-in penetration and approach requires approximately 400 pounds of fuel.

1F-16X-1-0106

Figure 7-1.

GCA (Typical)

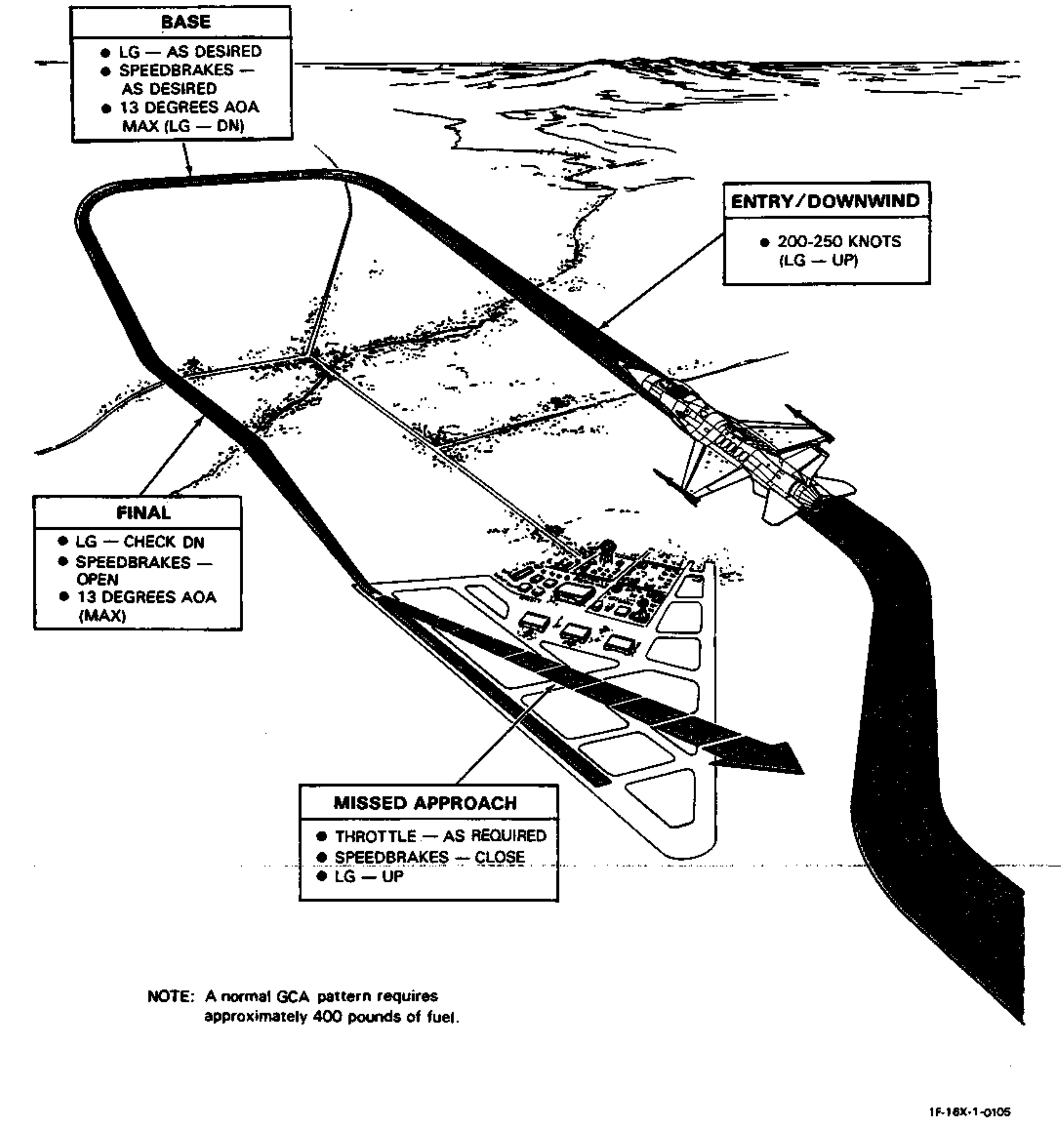


Figure 7-2.

The GM mode of the radar can be used as an aid in navigation between or around storm cells. Refer to T.O. 1F-16A-34-1-1 for expanded information. If entry into adverse weather cannot be avoided, the following procedures should be used:

1. PROBE HEAT switch - Check PROBE HEAT.
2. FLOOD CONSOLES knob - HIGH INT.
3. ANTI-ICE switch - ON.
4. Airspeed - 300 knots or optimum cruise, whichever is lower.

NOTE

- Severe turbulence will cause variations in airspeed and altitude. Do not change throttle setting except for extreme airspeed variations.
- An extremely loud screeching noise may be heard in the headset while flying in cirrus clouds or in the vicinity of thunderstorms. The noise may be eliminated by turning the UHF or VHF radio off, turning the volume(s) down, or by changing UHF antenna positions.
- When flying in heavy rain, water tends to be aerodynamically held on the forward portion of the canopy. At higher airspeeds, this condition may obscure visibility as much as 30 degrees back on each side of the canopy. On final approach, the water is generally confined to the position of the canopy immediately in front of the HUD. It may be necessary to look out the sides of the canopy to acquire the runway and to flare and land the aircraft.

COLD WEATHER OPERATION

BEFORE ENTERING COCKPIT

All accumulated ice and snow must be removed from the aircraft before flight is attempted. Insure that water does not accumulate on control surfaces or other critical areas where refreezing may cause damage or binding.

CAUTION

Do not permit ice to be chipped or scraped away.

BEFORE STARTING ENGINE

Extreme cold temperature may require cockpit preheating to ease operation of rotary-type switches. [B] The canopy may not latch on battery power alone. Start the engine with the canopy closed as much as possible.

If the pavement is wet or standing water is present and ambient temperature is 45°F (7°C) or less, place the ANTI-ICE switch to ON. This will reduce ice buildup on the engine front face, eliminate ice on the heated inlet strut, and reduce the possibility of ice ingestion.

(66) When the FLCS batteries have been cold soaked, they may not produce sufficient power to pass FLCS battery test. In this case, the use of external power will operate the battery heaters and improve the performance of the batteries. Prior to accomplishing the FLCS battery test, external power must be removed by placing the MAIN PWR switch to BATT. Several attempts should be made to test the FLCS batteries prior to aborting the aircraft as the current flow in the batteries during the test may heat the batteries sufficiently to produce the required power to pass the FLCS battery test. Holding the FLCS PWR TEST switch in TEST for 5-10 seconds each time also may improve the likelihood of passing the test.

STARTING ENGINE

If the aircraft has cold soaked for more than 1 hour at temperatures below -40°F (-40°C), do not start the JFS until the OAT has increased to above -40°F (-40°C) for at least 2 hours or the JFS has been preheated. For temperatures above -40°F (-40°C), refer to JFS LIMITS, Section V.

AFTER ENGINE START

For rapid cockpit warming, position the TEMP knob to the desired MAN WARM range. Position the RADAR knob to OFF and the DEFOG lever as required to clear fogging. After the cockpit reaches a comfortable temperature, select a setting within the AUTO range. If the engine was started with the canopy unlatched, wait approximately 10 minutes to warm the canopy.

If probe icing is evident or suspected, turn the PROBE HEAT switch to PROBE HEAT at least 2 minutes prior to accomplishing the FLCS self-test.

WARNING

If probe heat is or has been on, heat in probes may be sufficient to cause injury if touched.

Cycle flight controls to circulate warm fluid throughout the systems and check control reaction and operation. LESS 66 Delaying accomplishment of the FLCS self-test until after INS alignment is complete will allow additional time for FLCS battery warmup and will improve chances for successfully completing the self-test. After cold soaking at temperatures near –40°F (–40°C), the FLCS may not pass self-test before 15-20 minutes of warming.

TAXI

To avoid brake icing, do not taxi in deep water, slush, or deep snow. When taxiing on ice or hard packed snow, NWS may not be completely effective. Use a combination of NWS and differential braking to maintain directional control. Taxi at a safe speed considering surface condition, GW, slope, and thrust.

CAUTION

- If unable to control taxi speed or direction, immediately shut down the engine.
- If takeoff or first 2 minutes of climb will be in icing conditions, probe heat must be on at least 2 minutes prior to takeoff.

NOTE

After cold soaking at temperatures below 0°F (–18°C), be alert for flat MLG struts.

IN FLIGHT

Flight in areas of icing should be avoided whenever possible. If icing conditions are anticipated or cannot be avoided, turn ANTI-ICE switch to ON. Frequently check the aircraft leading edges for indication of ice buildup. Make all throttle movements slower than normal when in potential icing conditions to reduce possibility of engine stalls and/or stagnation. Consider diverting to an alternate field if required to avoid icing conditions.

WARNING

If probe heat is inoperative, icing of the AOA probes may cause loss of control which may vary from mild pitch oscillations to moderate pitch up or pitch down. Control should be regained when aircraft is clear of icing conditions.

LANDING IN ICING OR WET CONDITIONS

Icy or wet runway conditions may pose severe problems in directional control and braking effectiveness due to hydroplaning. Although possible, hydroplaning is not expected below 125 knots groundspeed. Wheel spinup must occur to permit normal antiskid braking. Hydroplaning can prevent wheel spinup and can occur on runways which only appear damp if heavy braking is applied at high speeds. Hydroplaning tendency increases with water depth and with smooth runway surfaces such as rubber deposits or paint stripes.

Approach and touchdown are the same as for a short field landing on a dry runway. Immediately after touchdown, make a deliberate effort to be sure brakes are not applied while using the rudder. NO Deploy the drag chute (if required) immediately after touchdown. Use two-point aerodynamic braking until approximately 80 knots; then fly the nosewheel to the runway. Maximum effective two-point aerodynamic braking is achieved at 13 degrees AOA. After the nosewheel is on the runway, open the speedbrakes fully and maintain full aft stick for maximum three-point aerodynamic braking and wheel braking effectiveness. Test for braking effectiveness before using full continuous braking by momentarily depressing pedals, fully releasing pedals for at least one-half second, and then depressing pedals again. This technique gives the wheels a better opportunity to spin up if hydroplaning conditions exist. If braking effectiveness is not felt, continue to pump brakes as speed decreases, making sure pedals are momentarily fully released between applications. Use continuous braking after braking effectiveness is felt. As speed decreases, the antiskid system will increase deceleration accordingly.

When stopping distance is critical, wheel braking should be initiated in the two-point attitude when below 100 knots. Wheel braking effectiveness at high speeds is very low compared to two-point aerodynamic braking effectiveness. Low deceleration at

high speed may be mistakenly interpreted as a brake or antiskid failure. If braking effectiveness or antiskid cycling is not perceived, release brakes momentarily and then reapply brakes. When the wheel brakes become effective, the nose will automatically lower. After the nosewheel is on the runway, maintain full aft stick, open the speedbrakes fully, and use continuous maximum braking. Do not hestitate to lower the hook, if required.

If crosswinds preclude maintaining two-point aerodynamic braking, test for braking effectiveness as previously discussed before using full continuous braking. Continue to pump the brakes until braking effectiveness is felt and speed is below 100 knots.

CAUTION

- Continuous wheel braking above 100 knots is not recommended. Hydroplaning may prevent spinup of both MLG wheels and wheel brakes may become operative without antiskid protection. Locked wheels and subsequent blown tires can occur.
- Rubber deposits on the last 2000 feet of a wet runway make directional control a difficult problem even at very low speeds. Braking should be started in sufficient time so as not to require excessive braking on the last portion of the runway.

HOT WEATHER AND DESERT GROUND OPERATION

Hot weather and desert operation require that added precautions be taken against damage from dust, sand, and high temperatures. Particular attention should be given to those components and systems (engine, fuel, oil, hydraulic, pitot-static, etc.) which are susceptible to contamination, malfunction, or damage from sand and dust. Inspect the pistons on the LG and have them cleaned as required. Check the engine inlet duct for sand accumulation. During conditions of blowing sand and dust, the canopy should be closed and sealed and all protective covers installed when the aircraft is not in use.

Leave the canopy open if the aircraft is to be exposed to direct sunlight at ambient temperatures above 90°F (32°C).

In hot, humid conditions, fogging of the exterior canopy surface after flight may reduce visibility to the point where the canopy must be opened prior to taxiing. Stow all equipment prior to opening the canopy.

APPENDIX 1

PERFORMANCE DATA

PART 1 - INTRODUCTION

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LIST OF CHARTS

INTRODUCTION

The data presented in the charts is applicable to aircraft equipped with an F100-PW-200 engine. All performance data is based on use of JP-4, JP-5, JP-8, or equivalent fuel. The data covers a flight spectrum ranging from sea level to approximately 60,000 feet and 0-2.0 mach. No conservatism factors have been used in any of the fuel consumption data presented herein. The appendix is divided into nine parts with performance data presented in an appropriate order for flight planning. Parts 1, 2, 3, 4, 5, 6, and 7 are presented in this manual. Parts 8 and 9 are presented in T.O. 1F-16A-1-1. The usage of the material requires that (except Part 9) all the text be presented first followed by all the charts. Because of the large number of stores and stores loading combinations the aircraft is capable of carrying, most charts are presented in a drag index format. All charts based on flight test data are based on the performance model derived from performance test results from the Full Scale Development Flight Test Program. The performance model reflects the engine trim

levels maintained on all the test engines during the development program. All engines are currently being trimmed to a slightly lower level to enhance engine life. The downtrim affects aircraft performance at MIL and above and when operating in the lower right corner of the envelope or at supersonic speeds. Cruise fuel consumption is not changed by engine trim. The effect of engine trim on performance is small and, under normal operating circumstances, can be neglected. In certain combinations, such as a hot day with a high drag loading, the engine trim level can result in performance changes which are not fully accounted for by the performance charts (i.e., level flight airspeed capability may be lower than predicted by the charts). The variance in engine trim levels and aircraft-to-aircraft differences can also produce performance changes of this same order of magnitude, making it impractical to show downtrim performance penalties on the charts.

NOTE

Limiting conditions relative to altitude, airspeed, stores, etc., are presented in Section V and should be checked prior to selecting mission conditions. All data is based on the (1962) U.S. standard atmosphere and the (1966) U.S. standard atmosphere supplements. Pressure altitude and true mach are used for all data unless specified otherwise.

DRAG INDEX AND CONFIGURATION WEIGHT

Drag index is a numerical factor which provides a means for quantifying the effects on aircraft performance of adding stores to the basic aircraft. The drag index system provides accurate corrections for store effects at all subsonic speeds (less than 1.0 mach). At supersonic speeds (greater than 1.0 mach), the size and shape of the store(s) affect drag to a significant degree, and a single value of drag index can no longer exactly represent all stores and combinations at these speeds. Therefore, it should be noted that actual supersonic performance may vary from that predicted by the performance charts.

Configuration weight is intended to facilitate mission planning by precomputing the weight of a configuration which is to be added to the aircraft operating weight to obtain aircraft start engine weight. Configuration weight is the weight of the complete configuration which is uploaded to the basic aircraft. The configuration weight includes the weight of all the stores (missiles, bombs, pods, etc.), suspension equipment, full external fuel tanks (if used), and ECM pod (if used).

The drag index and configuration weight of authorized takeoff store loadings are presented in the STORES LIMITATIONS, Section V.

The drag indices and weights of specific stores and suspension equipment items are given in figure A1-1. If the drag index and configuration weight for a specific loading are not presented in STORES LIMITATIONS, Section V (i.e., normal downloads), figure A1-1 may be used to determine drag index and configuration weight.

NOTE

- The drag index for a specific loading found in STORES LIMITATIONS, Section V, accounts for the combined effects of the stores on drag and therefore may vary slightly from the drag index computed using figure A1-1.
- Configuration weight for a specific loading found in STORES LIMITATIONS, Section V, may vary slightly from the weight computed using figure A1-1 due to rounding.

Aircraft start engine weight is determined by adding aircraft operating weight, internal usable fuel, and, if installed, ammunition, chaff/flares, and configuration weight. All these weights are given in figure A1-1.

The aircraft operating weight given is an approximate value and includes pilot, oxygen, oil, unusable fuel, launchers and NO drag chute. For individual aircraft weights and takeoff CG, refer to T.O. 1-1B-40 or to DD Form 365-4. An example of the determination of the drag index, configuration weight, and aircraft start engine weight is provided in the sample problem which follows.

REFER TO FIGURE A1-1.

Assume a loading of two AIM-9N missiles, two MK84 bombs, two 370-gallon fuel tanks, and a centerline ALQ-119-15 ECM pod. The drag index and configuration weight for this loading from STORES LIMITATIONS, Section V, are 136 and 11,132 pounds, respectively.

For this example, drag index and configuration weight are computed as follows:

STA 1 and 9 (2 AIM-9N missiles)

The basic aircraft drag index including tip missiles is zero and the weight of an AIM-9N is 169 pounds. For two AIM-9N's:

Drag index = 0
Weight = 2×169 = 338 pounds

STA 2 and 8 (clean)

STA 3 and 7 (MK84 on wing weapon pylon)

The drag index of one MK84 bomb is 11 and the bomb weight is 1970 pounds. The drag index of a pylon with MAU-12 rack at station 3, 4, 6, or 7 is 15 and the weight is 261 pounds. Since two MK84 bombs are to be carried on pylons, multiply each drag index and weight by 2 and sum the results. For two MK84's on wing weapon pylons:

Drag index = 2×11+2×15 = 52
Weight = 2×1970+2×261 = 4462 pounds

STA 4 and 6 (370-gallon fuel tanks)

In a similar manner, find that the drag index of one 370-gallon fuel tank, mounted on station 4 or 6 with single stores at 3 or 7, is 31 and its weight is 450 pounds (empty) or 2855 pounds (full). Note that no rack is required to install the tank on the wing. For two tanks:

Drag index = 2×31 = 62
Weight = 2×2855 = 5710 pounds (full)

STA 5 (ALQ-119-15 ECM pod)

The centerline ALQ-119-15 ECM pod has a drag index of 23 and weighs 623 pounds including its adapter pylon. No rack is required.

Drag index = 19+4 = 23
Weight = 580+43 = 623 pounds

The total drag index loading and configuration weight can now be determined by summing the individual store station values.

	Drag Index	Configuration Weight
STA 1 and 9	0	338
STA 2 and 8	0	0
STA 3 and 7	52	4,462
STA 4 and 6	62	5,710
STA 5	23	623
Total	137	11,133 pounds

Using these values plus the basic aircraft drag index and weights, the drag index and start engine weight can be determined:

Drag Index

Basic aircraft drag index	= 0* A
Store loading drag index	= 137
Drag index total	= 137

* Example drag index

Start Engine Weight

Aircraft operating weight	= 15,912** A
Internal usable fuel (JP-4)	= 6,972 A
Ammunition (full drum)	= 287
Chaff/flares (not loaded)	= 0
Configuration weight	= 11,133
Total start engine weight	= 34,304 pounds

** Example weight

NOTE

Assumed values for basic aircraft operating weight and basic drag index are used in the sample problems throughout this appendix in order to eliminate reworking the problems whenever the basic operating weight or basic aircraft drag index changes due to modifications to the aircraft. The sample problems are aids in using the appendix and are not necessarily applicable to specific configurations.

POSITION ERROR CORRECTION

A single nose boom-mounted pitot-static probe supplies static and total pressure information to the CADC, altimeter, and airspeed indicator. The CADC computes calibrated airspeed, true airspeed, true mach, and calibrated altitude and provides the required signals to drive the airspeed and altitude indications on the HUD.

The CADC provides corrected (calibrated) altitude signals to the altimeter when the altimeter is in ELECT. When the altimeter is in PNEU, it displays indicated (not corrected for position error) altitude. The airspeed indicator always displays indicated airspeed and mach number. Position error corrections are shown in figure A1-2.

REFER TO FIGURE A1-2.

Enter Position Error Correction – Airspeed and Altitude chart with desired calibrated airspeed (A), project vertically to desired pressure altitude lines (B), and proceed horizontally to read altitude correction (C) and airspeed correction (D). Subtract the corrections from the desired conditions to obtain indication reading. Mach position error corrections may be found in a similar manner.

SAMPLE PROBLEM.

A.	KCAS	= 380
B.	Pressure altitude	= 30,000 feet
C.	Altitude correction	= 175 feet
	Altimeter reading	= 30,000–175 = 29,825 feet
D.	Airspeed correction	= 1.5 knots
	Airspeed indicator reading	= 380–1.5 = 378.5 knots

AIRSPEED - MACH NUMBER

Curves shown in figure A1-3 are presented as an aid for conversion between calibrated airspeed and mach number.

REFER TO FIGURE A1-3, SHEET 1.

Enter Airspeed – Mach Number Conversion chart with calibrated airspeed (A). Proceed vertically to altitude (B) and horizontally left to read mach number (C). For convenience, standard day true airspeed can be read at (B) by interpolation between the true airspeed lines superimposed on the altitude curves.

SAMPLE PROBLEM.

A.	KCAS	= 300
B.	Altitude	= 30,000 feet
C.	Mach number	= 0.79
D.	Standard day KTAS	= 465

MACH - TRUE AIRSPEED CONVERSION

Figure A1-4 contains curves to be used in converting mach number to true airspeed for a range of atmospheric temperatures.

REFER TO FIGURE A1-4.

Enter Mach – True Airspeed Conversion chart with mach number (A). Project horizontally to the temperature (B) and then vertically down to read true airspeed (C).

SAMPLE PROBLEM.

A.	Mach number	= 0.79
B.	Temperature	= –44.5°C
C.	KTAS	= 465

COMPRESSIBILITY CORRECTION TO AIRSPEED

Figure A1-5 is provided as an aid to converting calibrated airspeed into equivalent airspeed.

REFER TO FIGURE A1-5.

Enter Compressibility Correction to Airspeed chart with calibrated airspeed (A) and project vertically upward to altitude (B) and proceed horizontally left to read compressibility correction (C). Note that the chart can also be entered at (B) with mach and altitude. Subtract the compressibility correction from calibrated airspeed to obtain equivalent airspeed.

SAMPLE PROBLEM.

A.	KCAS	= 300 knots
B.	Altitude	= 30,000 feet
C.	Compressibility correction	= 15 knots
	KEAS	= 300–15 = 285

MISCELLANEOUS CHARTS

ATMOSPHERIC TEMPERATURE AT ALTITUDE, figure A1-6, and TEMPERATURE CORRECTION FOR COMPRESSIBILITY, figure A1-7, are included for information. No samples are provided for these charts since they are self-explanatory.

ANGLE OF ATTACK (AOA)

AOA data is provided in figure A1-8 for information. AOA data for altitudes from sea level to 50,000 feet and from 0.3-1.2 mach is shown.

REFER TO FIGURE A1-8.

Enter AOA chart with GW (A); proceed horizontally to altitude (B), vertically down to mach number (C), and horizontally left to read AOA (D).

SAMPLE PROBLEM.

A.	GW	= 22,000 pounds
B.	Altitude	= 30,000 feet
C.	Mach number	= 0.79
D.	AOA	= 3.5 degrees

AVAILABLE LOAD FACTOR

Load factors available at 12 degrees AOA with the STORES CONFIG switch in CAT I or CAT III are presented in figure A1-9. The load factor data is presented as a function of calibrated airspeed and GW and is valid for up to 0.90 mach, LG up, all altitudes, temperatures, throttle settings, and store loadings. The chart may be used to estimate the available load factor for a given airspeed, AOA of 12 degrees, loading limit, and aircraft GW. The load factor value obtained from this chart is based solely on the aerodynamic characteristics of the aircraft. Sustained load factor capabilities are presented in Part 8.

REFER TO FIGURE A1-9.

Enter Available Load Factor chart with altitude (A) and calibrated airspeed (B). If mach number (C) is less than or equal to 0.90 mach, enter chart with calibrated airspeed (D). Project vertically to 12 degrees AOA, CAT I, or CAT III line (E) and then horizontally to the GW baseline and parallel guidelines to GW (F). Finally, project to right to read available load factor (G).

SAMPLE PROBLEM.

A.	Altitude	= 5000 feet
B.	KCAS	= 225
C.	Mach (For actual mach number (0.37), use figure A1-3)	= <0.90
D.	KCAS	= 225
E.	CAT III loading	
F.	GW	= 22,000 pounds
G.	Available load factor	= 2.5g

TURN CONVERSION

Figure A1-10 is provided as an aid for the conversion of load factor into turn rate and turn radius or turn rate into load factor, etc.

Drag Numbers and Weights — Suspension Equipment

DATA BASIS: FLIGHT TEST

SUSPENSION EQUIPMENT	STATION	JETTISON WEIGHT LB	TOTAL WEIGHT LB	DRAG INDEX
AIM-9 LAUNCHER	1 OR 9	0	69	0
AIM-9 LAUNCHER + ADAPTER	2 OR 8	0	95	8
	3 OR 7	0	95	3
CENTERLINE PYLON (INCL MAU-12C/A)	5	0	172	7
ECM CENTERLINE ADAPTER	5	0	43	4
LAU-88/A + WEAPON PYLON	3 OR 7	468	729	31
LAU-117/A + WEAPON PYLON	3 OR 7	130	391	17
TER-9/A + WEAPON PYLON	3,4,6 OR 7	93	354	23
WEAPON PYLON (INCL MAU-12C/A)	3,4,6 OR 7	0	261	15

*DRAG INDEX (SUBSONIC/SUPERSONIC)	F-16A	F-16B
• BASIC AIRCRAFT LESS 47	0/0	5/0
• BASIC AIRCRAFT 47	6/6	11/6
• $\boxed{\text{NO}}$ BASIC AIRCRAFT LESS 47	6/0	11/0
• $\boxed{\text{NO}}$ BASIC AIRCRAFT 47	12/6	17/6
*AIM-9J/P/N TIP MISSILES INCLUDED		

*AIRCRAFT OPERATING WEIGHT — LB	**F-16A	**F-16B
• BASIC AIRCRAFT LESS 47	16,000	16,800
• BASIC AIRCRAFT 47	16,500	17,300
• $\boxed{\text{NO}}$ BASIC AIRCRAFT LESS 47	16,300	17,200
• $\boxed{\text{NO}}$ BASIC AIRCRAFT 47	16,700	17,500
*INCLUDES PILOT ($\boxed{\text{B}}$ 2), OIL, OXYGEN, UNUSABLE FUEL, TIP MISSILE LAUNCHERS, AND $\boxed{\text{NO}}$ DRAG CHUTE		
**ALL WEIGHTS ARE APPROXIMATE. REFER TO INDIVIDUAL AIRCRAFT T.O. 1-1B-40 FOR ACTUAL AIRCRAFT WEIGHT		

EXPENDABLES WEIGHT — LB	F-16A	F-16B
INTERNAL USABLE FUEL (JP-4/JP-5, JP-8)	6972/7294	5785/6052
EXTERNAL USABLE FUEL (JP-4/JP-5, JP-8)		
• 300 – GALLON TANK	1950/2040	1950/2040
• 370 – GALLON TANK	2405/2516	2405/2516
CHAFF/FLARES	24	24
GUN AMMO		
• FULL DRUM	287	287
• FIRED OUT (RETAINED AMMO/CASINGS)	130	130

Figure A1-1. (Sheet 1)

Drag Numbers and Weights — Individual Stores

DATA BASIS: FLIGHT TEST

NOTE: WEIGHT AND DRAG INDICES DO NOT INCLUDE SUSPENSION EQUIPMENT. REFER TO SHEET 1.

STORE	STATION	RACK	WEIGHT LB (EACH STORE)	DRAG INDEX (EACH STORE)
AGM-65A,B	3 OR 7	LAU-88/A	464	13
AIM-9J/P/N	1 OR 9	LAUNCHER	169	4**
AIM-9L/M	1 OR 9	LAUNCHER	195	7**
AIM-9J/P/N	2,3,7 OR 8	LAUNCHER & ADAPTER	169	7
AIM-9L/M	2,3,7 OR 8	LAUNCHER & ADAPTER	195	10
AIS (ACMI) POD	2,3,7 OR 8	LAUNCHER & ADAPTER	123	4
	1 OR 9	LAUNCHER & ADAPTER	123	4
AN/ALQ-119-12/15	3,5 OR 7	ADAPTER/PYLON	580	19
AN/ALQ-119-14/17	3,5 OR 7	ADAPTER/PYLON	406	19
AN/ALQ-131:				
TERMINAL THREAT DEEP	3,5 OR 7	ADAPTER/PYLON	675/635*	25
TWO-BAND SHALLOW	3,5 OR 7	ADAPTER/PYLON	535*	20
B57	3,4,5,6 OR 7	PYLON	510	9
B61 (BDU-38):				
MOD, 0, 1, 2, 5	3,4,5,6 OR 7	PYLON	716	8
MOD 3,4	3,4,5,6 OR 7	PYLON	751	8
BDU-33B/B, D/B	3,4,6 OR 7	TER-9/A	23	1
BL-755 MK 2	3,4,6 OR 7	PYLON/TER-9/A	610	20/24
BLU-1C/B (UNFINNED)	3,4,6 OR 7	PYLON	707	9
BLU-52	3,4,6 OR 7	PYLON	360	12
BSU-49	3,4,6 OR 7	PYLON/TER-9/A	540	6/9
BSU-50	3,4,6 OR 7	PYLON	2010	13
CBU-52/B (SUU-30 H/B)	3,4,6 OR 7	PYLON/TER-9/A	785	20/24
CBU-58/B, A/B (SUU-30 H/B)	3,4,6 OR 7	PYLON/TER-9/A	800	20/24
CBU-71B, A/B (SUU-30 H/B)	3,4,6 OR 7	PYLON/TER-9/A	800	20/24

*WITHOUT RECEIVER PROCESSOR

**USED FOR REMOVING WINGTIP MISSILE, SINCE BASIC AIRCRAFT CONFIGURATION INCLUDES AIM-9'S @ 1 AND 9. USING DRAG INDEX ZERO GIVES SLIGHTLY CONSERVATIVE RESULTS WITHOUT TIP MISSILES.

Figure A1-1. (Sheet 2)

Drag Numbers and Weights — Individual Stores

DATA BASIS: FLIGHT TEST

NOTE: WEIGHT AND DRAG INDICES DO NOT INCLUDE SUSPENSION EQUIPMENT. REFER TO SHEET 1.

STORE	STATION	RACK	WEIGHT LB (EACH STORE)	DRAG INDEX (EACH STORE)
GBU-10/B, A/B	3 OR 7	PYLON	2052	17
GBU-12/B, A/B, B/B, C/B, D/B	3,4,6 OR 7	PYLON	611	9
LAU-3/A, C/A, D/A ROCKET LAUNCHER:				
(19) M151	3 OR 7	TER-9/A	491	15
(19) M156	3 OR 7	TER-9/A	503	15
(19) MK1	3 OR 7	TER-9/A	420	15
(19) MK5	3 OR 7	TER-9/A	427	15
FIRED OUT (NO FAIRINGS)	3 OR 7	TER-9/A	71	24
EMPTY WITH FAIRINGS	3 OR 7	TER-9/A	73	15
LAU-5003/A ROCKET LAUNCHER:				
(19) RA-79	3 OR 7	TER-9/A	646	15
(19) CM-151	3 OR 7	TER-9/A	646	15
FIRED OUT (NO FAIRINGS)	3 OR 7	TER-9/A	76	24
EMPTY WITH FAIRINGS	3 OR 7	TER-9/A	78	15
M129E2 (LEAFLET BOMB)	3,4,6 OR 7	PYLON	205	16
MC-1	3,4,6 OR 7	PYLON	673	12
MK20 MOD 3,4,6	3,4,6 OR 7	PYLON/TER-9/A	490	11/14
MK36 DESTRUCTOR	3,4,6 OR 7	PYLON/TER-9/A	550	6/9
MK82 (GENERAL PURPOSE)	3,4,6 OR 7	PYLON/TER-9/A	510	4/7
MK82 (SNAKEYE)	3,4,6 OR 7	PYLON/TER-9/A	550	6/9
MK84	3,4,6 OR 7	PYLON	1970	11
MXU-648/A (TRAVEL POD) (MAX CARGO WT IS 300 LB)	3,4,5,6 OR 7	PYLON/TER-9/A	125 (EMPTY)	12/15

Figure A1-1. (Sheet 3)

Drag Numbers and Weights — Individual Stores

DATA BASIS: FLIGHT TEST

NOTE: WEIGHT AND DRAG INDICES DO NOT INCLUDE SUSPENSION EQUIPMENT. REFER TO SHEET 1.

STORE	STATION	RACK	WEIGHT LB (EACH STORE)	DRAG INDEX (EACH STORE)
SECAPEM-908 BE				
TARGET STOWED	3 AND 4	PYLON	498	26
TARGET DEPLOYED	3	PYLON	498	171
CABLE POD ONLY (TARGET/CABLE RELEASED)	3	PYLON	295	14
SUU-20A/A,B/A:			(A/A) (B/A)	
(6) BDU-33	3 OR 7	PYLON	468 414	14
(6) MK106	3 OR 7	PYLON	360 306	14
(4) 2.75" FFAR (MK151)	3 OR 7	PYLON	418 364	14
(6) BDU-33+(4) 2.75" FFAR (MK151)	3 OR 7	PYLON	556 502	14
(6) MK106+(4) 2.75" FFAR (MK151)	3 OR 7	PYLON	448 394	14
EMPTY	3 OR 7	PYLON	330 276	12
TGM-65	3 OR 7	LAU-88/A	400	13
300-GALLON TANK (EMPTY/FULL):				
NO STORES @ 4 OR 6	5	PYLON	354/2304	23
STORES @ 4 AND 6	5	PYLON	354/2304	26
370-GALLON (EMPTY/FULL):				
NO STORES @ 3 OR 7	4 OR 6	NONE	450/2855*	23
AIM-9'S @ 3 OR 7	4 OR 6	NONE	450/2855*	23
SINGLE RACKS OR STORES @ 3 OR 7	4 OR 6	NONE	450/2855*	31
MULTIPLE STORES @ 3 OR 7	4 OR 6	NONE	450/2855*	35

*INCLUDES UNUSABLE FUEL

Figure A1-1. (Sheet 4)

Position Error Correction – Airspeed and Altitude

DATA BASIS: FLIGHT TEST **ENGINE: F100-PW-200**

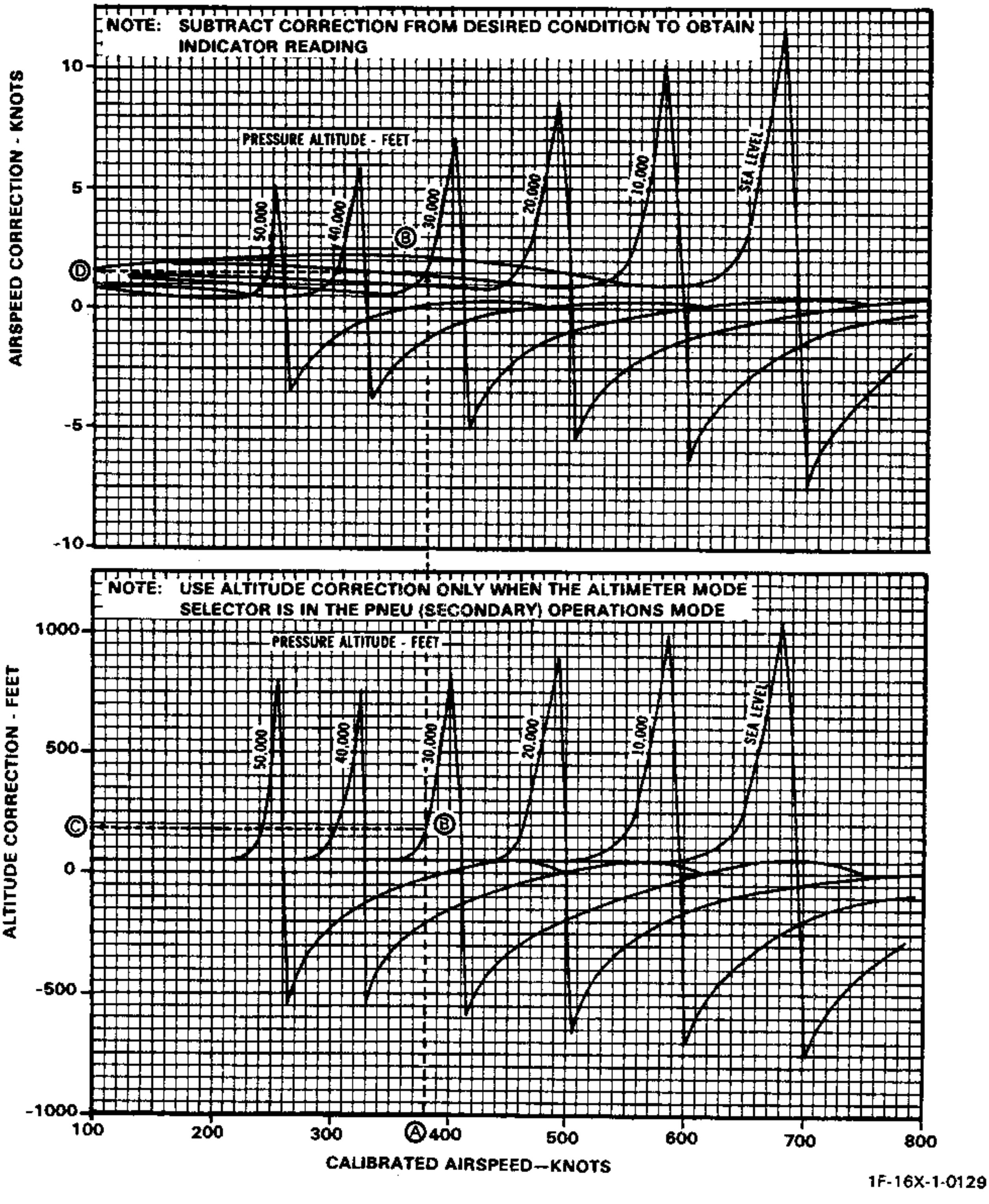

Figure A1-2. (Sheet 1)

Position Error Correction — Mach Number

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

NOTE: SUBTRACT FROM THE TRUE MACH TO OBTAIN MACH INDICATOR READING

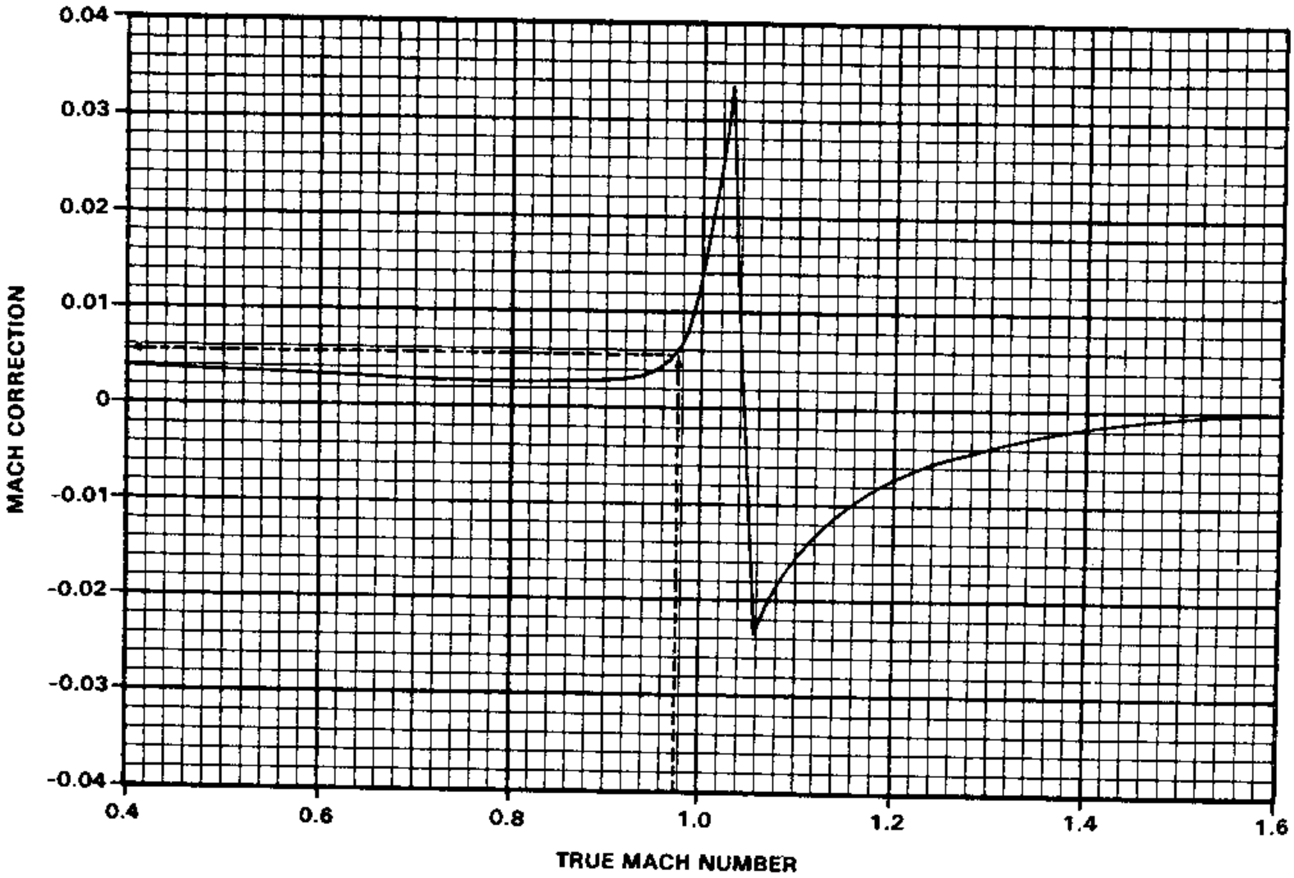

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Figure A1-2. (Sheet 2)

Airspeed – Mach Number Conversion

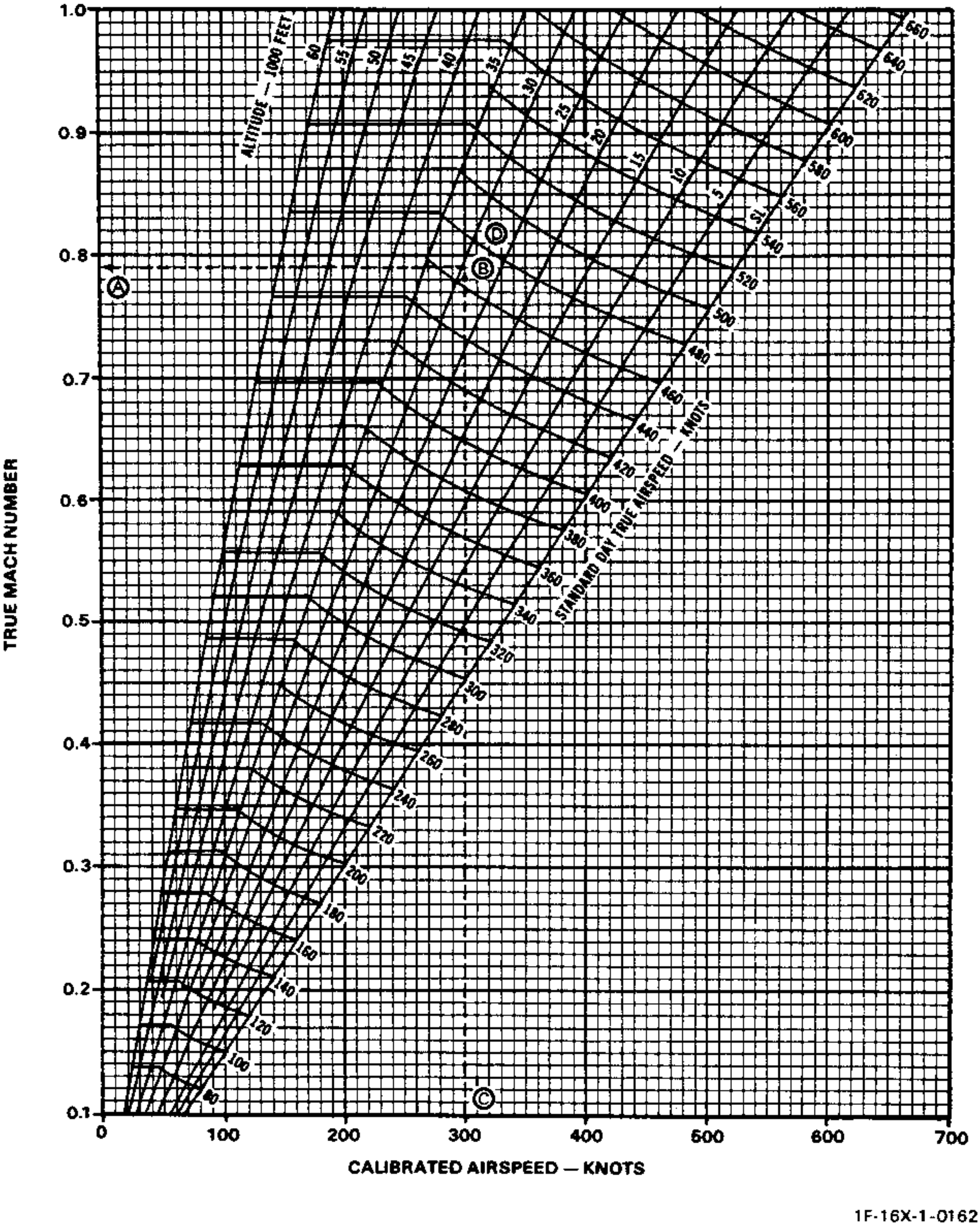

Figure A1-3. (Sheet 1)

Airspeed — Mach Number Conversion

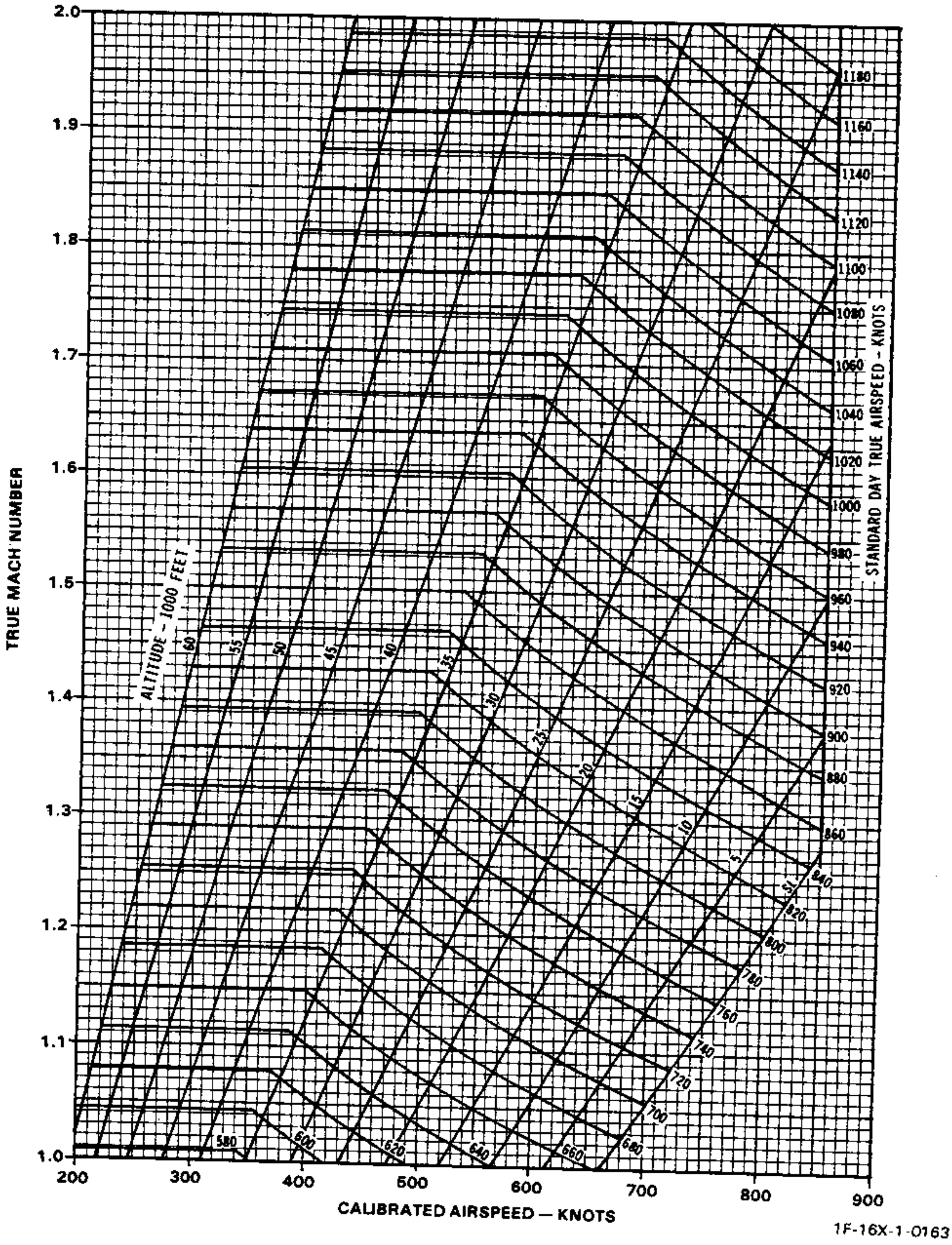

Figure A1-3. (Sheet 2)

Mach — True Airspeed Conversion

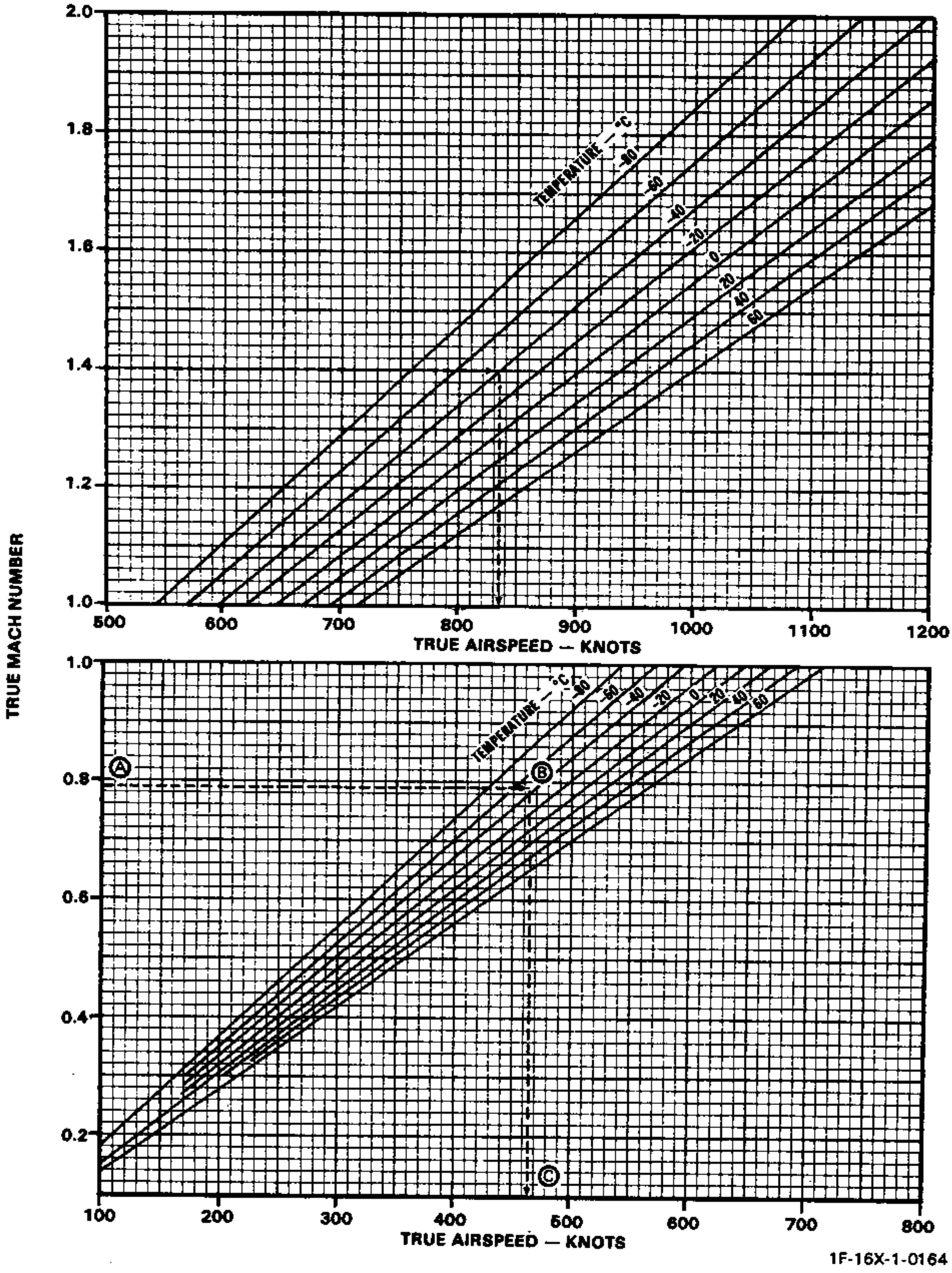

Figure A1-4.

Compressibility Correction to Airspeed

EQUIVALENT AIRSPEED = CALIBRATED AIRSPEED — CORRECTION

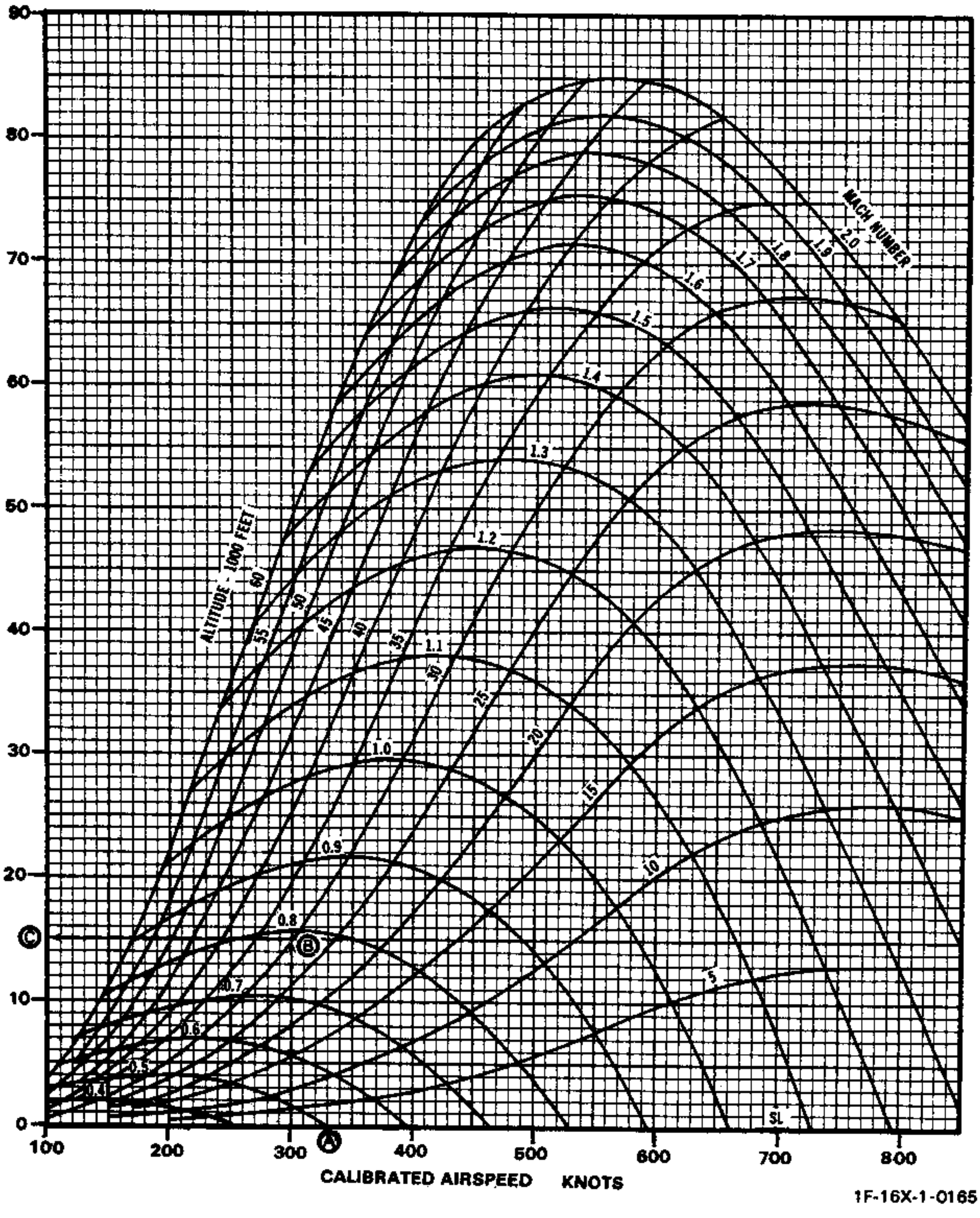

Figure A1-5.

Atmospheric Temperature at Altitude

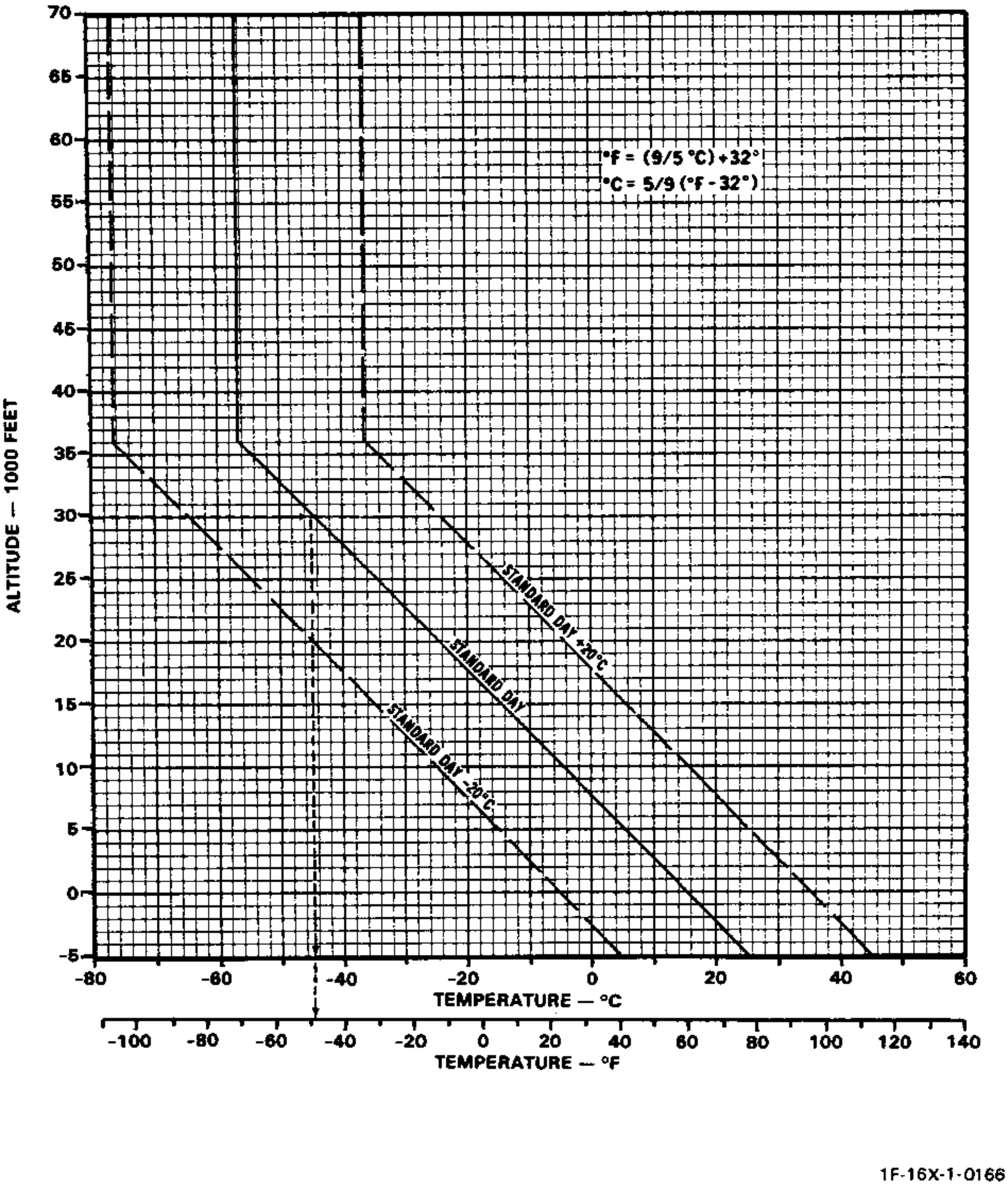

Figure A1-6.

Temperature Correction for Compressibility

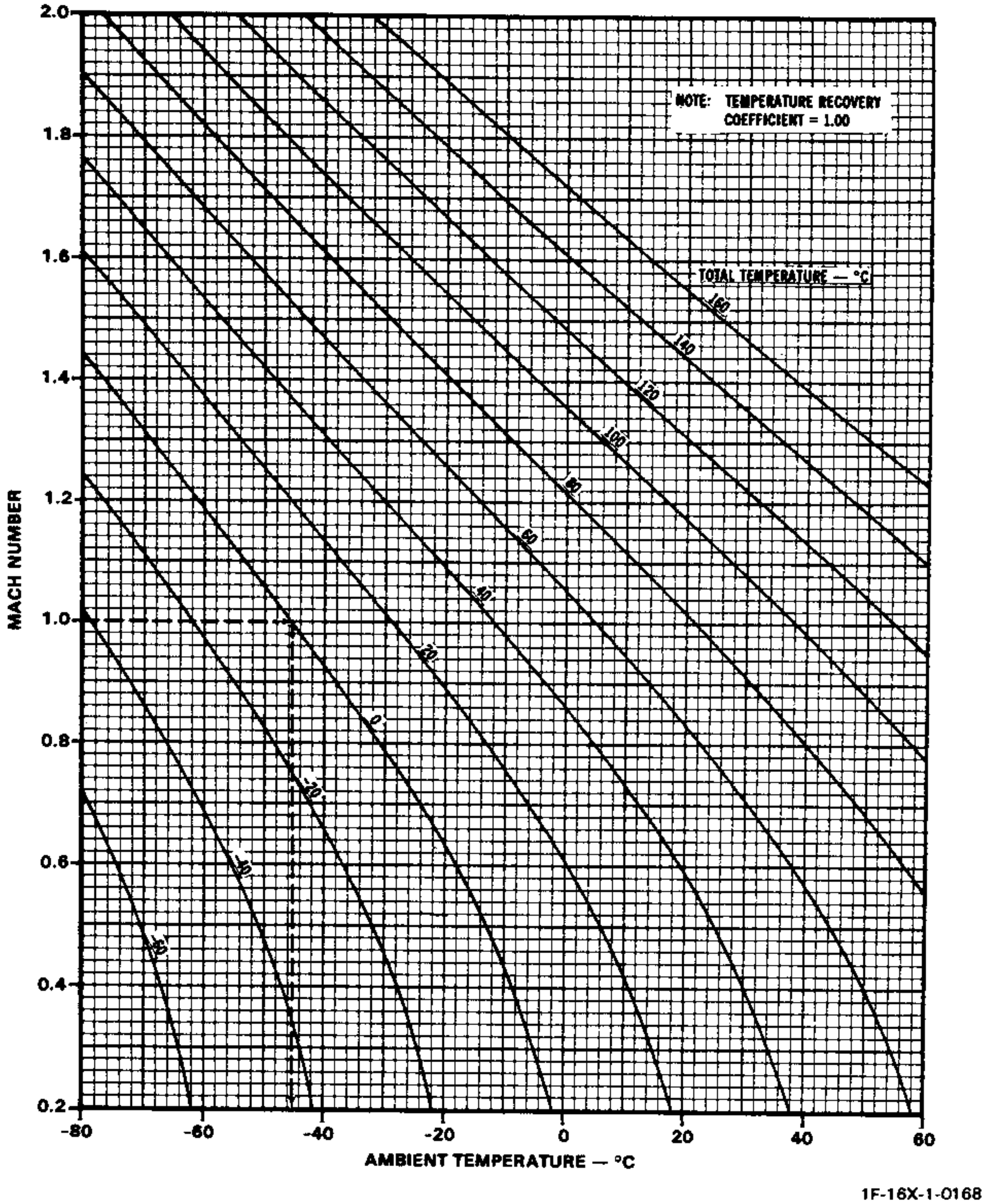

Figure A1-7.

Angle of Attack

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONFIGURATION:
- LG – UP
- ALL DRAG INDICES

CONDITIONS:
- 1 G LEVEL FLIGHT
- NO THRUST EFFECTS INCLUDED

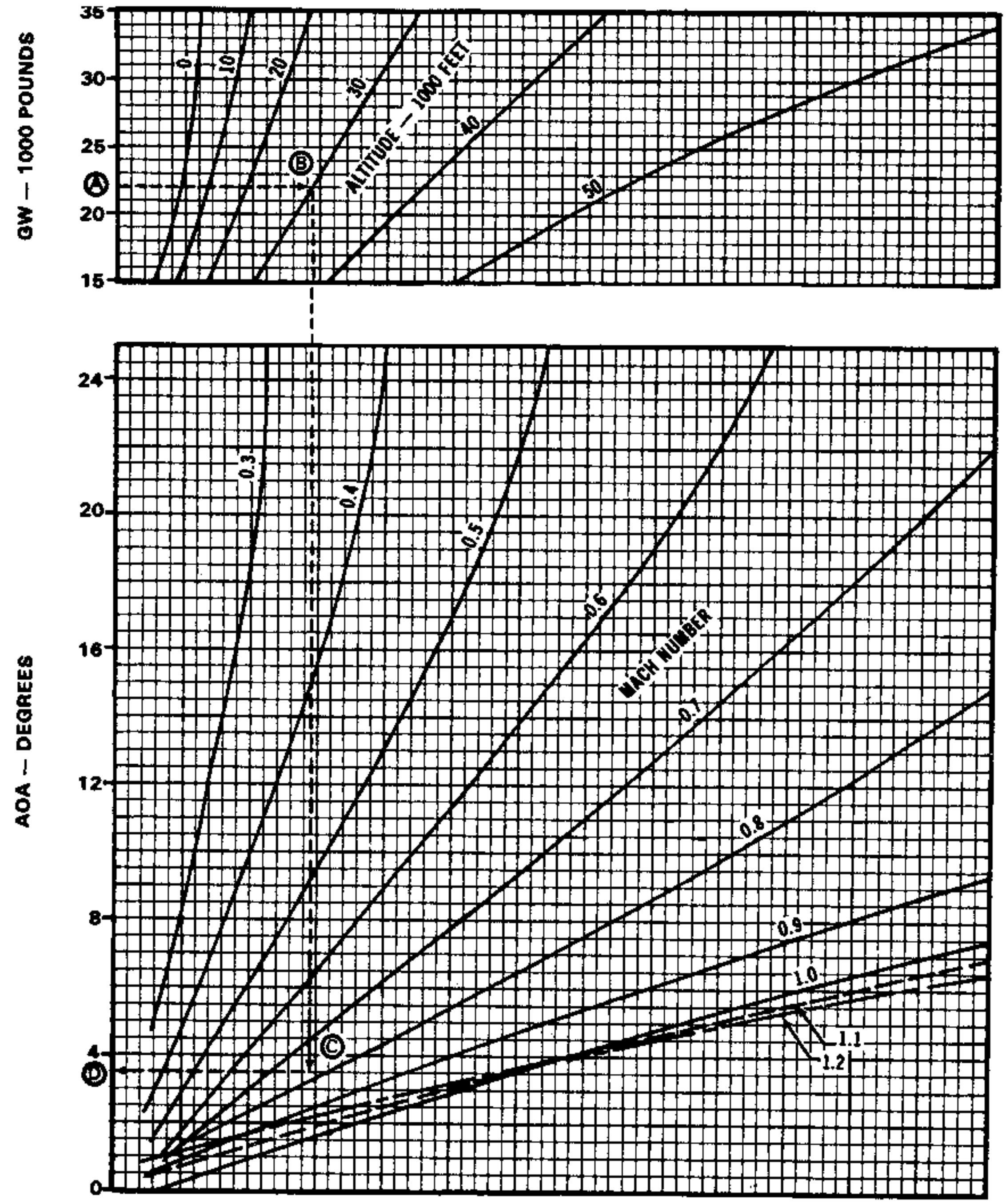

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Figure A1-8.

Available Load Factor

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

NOTE: LESS 47
CATEGORY II LOADINGS
USE CAT I OR CAT III
LINE AS DESIRED.

CONFIGURATION:
- ALL DRAG INDICES
- LG – UP

CONDITIONS:
- ≤0.90 MACH
- ALL ALTITUDES
- ALL TEMPERATURES
- ALL THROTTLE SETTINGS

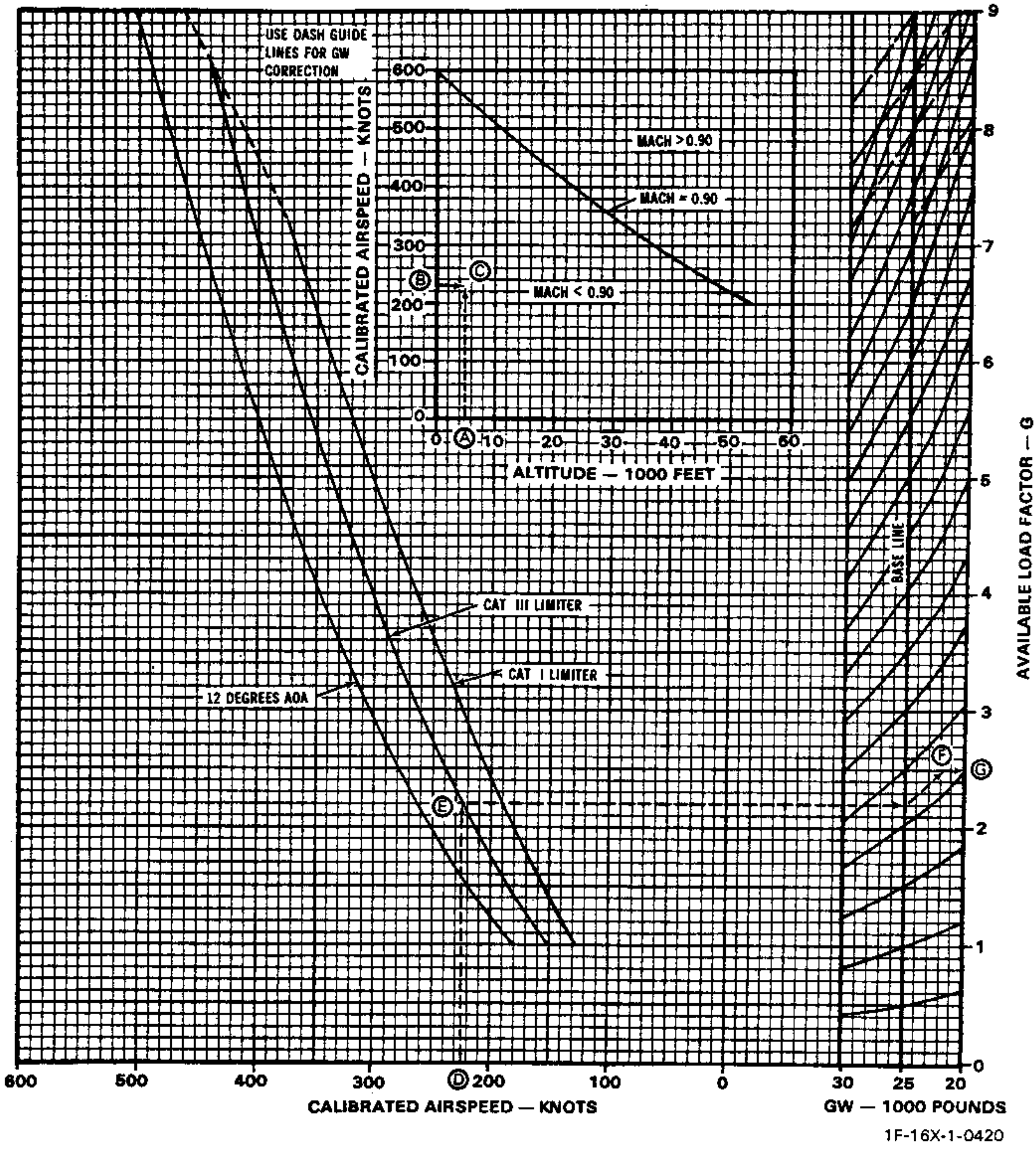

Figure A1-9.

Turn Conversion

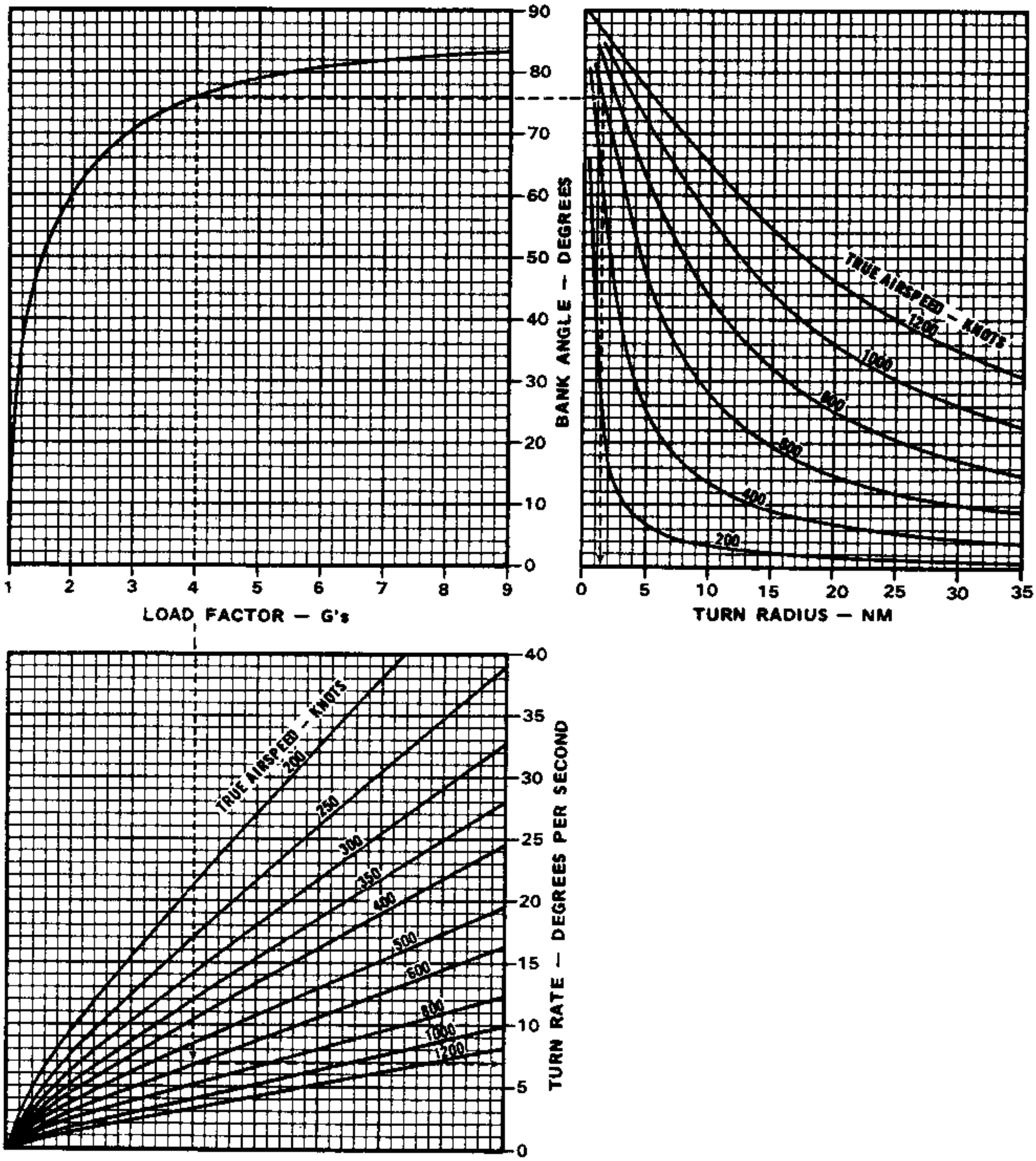

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Figure A1-10.

PART 2 - TAKEOFF

TABLE OF CONTENTS

LIST OF CHARTS

TAKEOFF DATA

All data needed for takeoff planning is presented in this section. Takeoff data is presented for MIL and MAX AB throttle settings. All data is based on use of automatic flaps (LEF's are at -2 degrees and TEF's are at 20 degrees while weight is on the MLG). Rotation speed, takeoff speed, ground run distance, acceleration check speed, maximum refusal speed (NO with and without drag chute), and crosswind data may be determined from these charts. Effects of wind, temperature, pressure altitude, runway slope and length, drag index, and RCR are included on appropriate charts.

DEFINITIONS OF TERMS

Takeoff factor - A computed number which is a function of engine thrust, temperature, and altitude. It is used as a control parameter for most charts in this section.

Rotation speed - Airspeed at which rotation to lift-off attitude should be started.

Takeoff speed - Speed at which the main tires leave the ground.

Takeoff ground run distance (also takeoff distance) - Ground run in feet from brake release to takeoff speed.

Refusal speed – Maximum airspeed that can be attained by acceleration at MIL or MAX AB and still stop on remaining runway should takeoff be aborted.

Minimum AB blowout speed – Minimum airspeed at which an AB blowout can occur and still reach takeoff speed within the remaining runway length using MIL.

Runway slope – Change in runway elevation divided by runway length multiplied by 100 (expressed in percent uphill or downhill).

Aerodynamic braking (three-point attitude) – Use of fully opened speedbrakes and maximum horizontal tail deflection (without raising nose tire from runway) to increase deceleration. (Data base for aborted takeoff.)

Maximum effort braking – A single continuous wheel brake application using maximum pedal pressure consistent with maintaining directional control (antiskid on) in conjunction with aerodynamic braking and NO drag chute.

DATA BASIS FOR CHARTS

The takeoff performance data in this part has been adjusted to match available flight test data; however, incomplete braking tests preclude updating all charts to a flight test data basis. Changes in LEF's positions and engine bleed requirements for weight on or off LG have been accounted for, as appropriate. Assumptions and approximations made during the construction of each chart are discussed along with the chart.

TAKEOFF PLANNING

Careful takeoff planning is essential from a standpoint of flight safety and mission success. Proper planning will permit maximum use of the capability of the aircraft to take off with heavy payloads while maintaining adequate safety margins. Takeoff planning comprises the following:

1. Determine aircraft configuration (total aircraft takeoff GW and drag index). Normal takeoffs may be made using MIL or MAX AB throttle setting.

2. Obtain field conditions for expected takeoff time (pressure altitude, temperature, wind, runway length, slope, etc.).

3. Compute the following data from the charts:

   a. Takeoff factor, which will be used to enter most other charts in this section.

   b. Rotation speed.

   c. Takeoff speed.

   d. Maximum refusal speed.

   e. Wind components.

This information will permit decisions to be made regarding downloading or continuing or aborting takeoff in the event of an emergency. Each chart is discussed in detail in the following paragraphs. An example takeoff planning problem is worked in conjunction with the discussion. The following typical aircraft and field information is normally obtained before using the charts:

Takeoff GW (aircraft operating weight plus fuel, ammo, and stores)	=	33,000 pounds (Allow for ground operation fuel consumption; refer to Part 3) (Normal taxi operations require approximately 25 pounds of fuel per minute)
Store loading	=	Two AIM-9N missiles at stations 1 and 9, two MK84 bombs at stations 3 and 7, two 370-gallon fuel tanks at stations 4 and 6, ALQ-119-15 ECM pod at station 5
Takeoff CG	=	Refer to DD Form 365-4
Drag index	=	Refer to STORES LIMITATIONS, Section V
Runway pressure altitude	=	2000 feet
Runway temperature	=	42°C
Runway length	=	9000 feet (available length)
Runway condition	=	Dry concrete (RCR=23)
Runway slope	=	1 percent (uphill)
Runway wind	=	10 knots (headwind)

TAKEOFF FACTOR

The takeoff factor concept of presenting takeoff performance is used to simplify chart presentations. The takeoff factor is a computed number and is common to all charts for a given thrust setting, pressure altitude, and temperature.

REFER TO FIGURE A2-1.

Enter the chart with runway temperature (A). Project horizontally to pressure altitude (B) and then vertically down to read MIL takeoff factor (C) or MAX AB takeoff factor (D).

SAMPLE PROBLEM.

A.	Runway temperature	=	42°C
B.	Pressure altitude	=	2000 feet
C.	MIL takeoff factor	=	3.5
D.	MAX takeoff factor	=	1.92

TAKEOFF SPEED LESS 47

Takeoff and rotation speeds are obtained from figure A2-2 (sheet 1).

On figure A2-2, the discontinuity at 28,000 pounds GW and the use of two lines (MIL and MAX AB) for the heavier GW and only one line for the lighter weights result from differences in CG. For most configurations with GW less than 28,000 pounds and without external fuel, the aircraft vertical CG is near the thrust line (i.e., engine centerline); therefore, the moment due to thrust about the aircraft CG is negligible, and the takeoff speed with MIL is the same as with MAX AB. GW's above 28,000 pounds normally have full external wing tanks which will move the aircraft CG forward and down. With this moment arm, engine thrust applies a nosedown moment which the horizontal tail must overcome to lift the nose tire off the runway. The airspeed required to produce the noseup moment increases as thrust increases, necessitating two lines on figure A2-2 for takeoff speed at heavier GW's.

Enter chart with takeoff GW (A). Project vertically to appropriate takeoff thrustline and then horizontally left to read uncorrected takeoff speed (B). From the uncorrected takeoff speed, project horizontally right to the takeoff CG baseline and follow guideline to CG (C). Finally, project horizontally right to read corrected takeoff speed (D). Rotate at 15 knots less than corrected takeoff speed. (Airspeed increments for external fuel tank loadings defined in the notes are to be applied to the corrected airspeeds only.)

SAMPLE PROBLEM (MAX AB THRUST).

A.	GW	=	33,000 pounds
B.	Uncorrected takeoff speed	=	185 KIAS
C.	Takeoff CG	=	35.5 percent
D.	Corrected takeoff speed	=	179 KIAS
E.	Rotation speed	=	179–15 = 164 KIAS

SAMPLE PROBLEM (MIL THRUST).

A.	GW	=	33,000 pounds
F.	Uncorrected takeoff speed	=	178 KIAS
G.	Takeoff CG	=	35.5 percent
H.	Corrected takeoff speed	=	172 KIAS
I.	Rotation speed	=	172–15 = 157 KIAS

TAKEOFF SPEED 47

Takeoff and rotation speeds are obtained from figure A2-2 (sheet 2).

REFER TO FIGURE A2-2 (SHEET 2).

Enter chart with takeoff GW (A), project vertically to takeoff speed line (B), and project horizontally left to takeoff speed (C) for 35 percent CG. Then compute takeoff and rotation speeds for the actual takeoff CG.

SAMPLE PROBLEM (MIL OR MAX AB).

A.	GW	=	33,000 pounds
B.	CG	=	35.5 percent
C.	Takeoff speed at 35.0 percent CG	=	170 KIAS
D.	Takeoff speed at 35.5 percent CG: $170-(0.8\times0.5)$	=	170 KIAS
E.	Rotation speed:		
	MIL	=	160 KIAS
	MAX AB	=	155 KIAS

Rotation to 10 degrees pitch angle for lift-off increases takeoff speed 6 percent

D.	Takeoff speed at 35.5 percent CG: 170×1.06	=	180 KIAS
E.	Rotation speed:		
	MIL	=	170 KIAS
	MAX AB	=	165 KIAS

TAKEOFF DISTANCE LESS 47

Distance from brake release to takeoff speed may be determined from figure A2-3 for MIL or MAX AB. Because the brakes cannot hold the aircraft when takeoff thrust is applied, takeoff thrust should be selected as quickly as practical after brake release. Distance traveled between brake release and the time when takeoff thrust is reached is negligible if the throttle is positioned to the desired throttle setting immediately after brake release. Effects of GW, drag index, wind, and runway slope are given on the chart.

REFER TO FIGURE A2-3 (SHEETS 1 AND 2).

Enter the chart with MIL or MAX takeoff factor (A). Project horizontally to GW (B) and then vertically down to drag baseline and follow guidelines to drag index (C). Proceed downward to slope baseline and parallel guidelines to slope (D), continue to wind baseline, again parallel guidelines to wind (E), and finally proceed down to read uncorrected takeoff distance (F).

SAMPLE PROBLEM (SHEET 1).

A. MIL takeoff factor = 3.5
B. GW = 33,000 pounds
C. Drag index = 136
D. Slope = 1 percent (uphill)
E. Wind = 10 knots (headwind)
F. Uncorrected ground run distance = 8000 feet

Using a MAX AB takeoff factor of 1.92, the uncorrected takeoff distance is 4650 feet.

SAMPLE PROBLEM (SHEET 2).

Enter the chart with uncorrected takeoff speed (A). Project horizontally to corrected takeoff speed (B) and then vertically up to uncorrected takeoff distance (C). Then project horizontally to the left and read corrected takeoff ground run distance (D).

For MIL:

A. Uncorrected takeoff speed = 178 KIAS
B. Corrected takeoff speed = 172 KIAS
C. Uncorrected ground run distance = 8000 feet
D. Corrected ground run distance = 7550 feet

For MAX AB:

E. Uncorrected takeoff speed = 185 KIAS
F. Corrected takeoff speed = 179 KIAS
G. Uncorrected ground run distance = 4650 feet
H. Corrected ground run distance = 4400 feet

Because of the short runway (9000 feet) and high GW combination, MAX AB should be used.

TAKEOFF DISTANCE 47

Distance from brake release to takeoff speed may be determined from figure A2-3 for MIL or MAX AB. Because the brakes cannot hold the aircraft when takeoff thrust is applied, takeoff thrust should be selected as quickly as practical after brake release. Thrust buildup to takeoff thrust is considered in the takeoff distance. Effects of GW, CG, drag index, wind, and runway slope are given on the chart.

REFER TO FIGURE A2-3 (SHEET 3).

Enter the chart with MIL or MAX AB takeoff factor (A). Project horizontally to GW (B), then vertically down to CG baseline, and follow guideline to CG (C). Proceed downward to drag index baseline and parallel guidelines to drag index (D). Proceed downward to slope baseline and parallel guideline to slope (E); continue to wind baseline, again parallel guidelines to wind (F), and finally proceed down to read takeoff distance (G).

SAMPLE PROBLEM.

A. MIL takeoff factor = 3.5
B. GW = 33,000 pounds
C. CG = 35.5 percent
D. Drag index = 136
E. Slope = 1 percent (uphill)
F. Wind = 10 knots (headwind)
G. Takeoff distance = 7040 feet

Using a MAX AB takeoff factor of 1.92, takeoff distance is 3525 feet.

Rotation to 10 degrees pitch angle for lift-off will increase takeoff distance 12 percent.

G. Takeoff distance:

MIL 7040 × 1.12	=	7885 feet
MAX AB 3525 × 1.12	=	3948 feet

Because of the short runway (9000 feet) and high GW combination, MAX AB should be used.

ACCELERATION CHECK SPEED

Airspeed during takeoff ground roll is presented in figure A2-4. Airspeed from start of takeoff roll or between any two points during takeoff roll can be checked. Takeoff thrust should be selected as quickly as practical after brake release in order to minimize distance covered during engine acceleration. Reliable HUD airspeed indications should begin at about 50 knots.

REFER TO FIGURE A2-4.

Enter chart with takeoff factor (either MIL or MAX AB) (A). Project horizontally to the right to a distance line (B), down to the GW baseline and parallel the nearest weight guideline to GW (C), down to drag index baseline and parallel the nearest guideline to drag index (D), down to wind baseline and parallel nearest guideline to wind (E), down to slope baseline and parallel nearest guideline to slope (F), and finally down to read acceleration check speed (G).

SAMPLE PROBLEM.

A. Takeoff factor (MAX AB)	=	1.92
B. Distance from brake release	=	2000 feet
C. GW	=	33,000 pounds
D. Drag index	=	136
E. Wind	=	10 knots (headwind)
F. Slope	=	1 percent (uphill)
G. Acceleration check speed	=	129 KIAS

REFUSAL SPEED

Refusal speed for MIL and MAX AB takeoffs is presented in figures A2-5 and A2-7 for dry concrete runways. Effects of runway length, wind, and slope are shown on the charts. Drag index effects are negligible. Three-point aerodynamic braking is to be used until speed has been reduced to maximum brake application speed. Runway conditions for inclement weather are shown in figures A2-6 and A2-8.

NO Refusal speeds with drag chute for MIL and MAX AB takeoffs are presented in figures A2-9 and A2-10 for dry concrete runways. The drag chute is deployed at refusal speed. Refer to Section V for limits.

REFER TO FIGURE A2-7.

Enter appropriate chart with takeoff factor (A). Project horizontally left to GW (B) and then vertically up to runway length (C). From there, proceed horizontally right to wind baseline and parallel nearest guideline to wind (D) and then horizontally right to slope baseline and parallel nearest guideline to slope (E). Finally, project horizontally right to read refusal speed (dry runway) (F).

SAMPLE PROBLEM.

A. Takeoff factor (MAX AB)	=	1.92
B. GW	=	33,000 pounds
C. Available runway length	=	9000 feet
D. Wind	=	10 knots (headwind)
E. Slope	=	1 percent (uphill)
F. Refusal speed (dry runway)	=	168 KIAS

NOTE

Maximum antiskid braking should be applied when airspeed is below the maximum brake application speed obtained from figure A2-15.

EFFECT OF RUNWAY CONDITION ON REFUSAL SPEED

Runway conditions have a significant effect on stopping performance. The effect of runway conditions other than dry concrete is shown in figures A2-6, A2-8, and NO A2-11. Runway conditions are shown on the chart by representative values of RCR. Wet runways are shown as RCR of 18 and 12. The wet runway effects as shown consider the effects of incipient hydroplaning only; actual hydroplaning

effects are not shown. Other RCR values shown are 16, which is representative of a dry, smooth surface with poor braking characteristics; 8, which is representative of a loose covering of snow; and 4, which is representative of smooth ice.

REFER TO FIGURE A2-8.

Enter chart with dry runway refusal speed (from figure A2-7) (A). Project to the right to the appropriate GW (B) and then down to read corrected refusal speed (C).

SAMPLE PROBLEM.

If the runway is reported as wet, with visible water on the surface, an RCR of 12 (wet) is used.

A.	Refusal speed (dry runway)	= 168 KIAS
B.	GW	= 33,000 pounds
C.	Corrected refusal speed (RCR=12)	= 120 KIAS

MINIMUM AB BLOWOUT SPEED

A MAX AB takeoff can be safely continued after an AB blowout only if minimum AB blowout speed has been attained prior to the blowout. If the engine instruments indicate normal MIL operation after the blowout at minimum AB blowout speed, the takeoff can be continued and takeoff speed attained within the remaining runway length. Figure A2-12 contains data needed to determine minimum AB blowout speed.

REFER TO FIGURE A2-12.

Enter chart with MAX AB takeoff factor (A). Project to the right to GW (B), then down to drag baseline and follow guidelines to drag index (C), down to wind baseline and follow guidelines to wind (D), and down to slope baseline and follow guidelines to slope (E). From (E), project down to runway length baseline, follow guidelines to runway length (F), and then project to the left to GW baseline. Follow guidelines to GW and finally to the left to read minimum AB blowout speed (G).

SAMPLE PROBLEM.

A.	MAX AB takeoff factor	= 1.92
B.	GW	= 33,000 pounds
C.	Drag index	= 136
D.	Wind	= 10 knots (headwind)
E.	Slope	= 1 percent (uphill)
F.	Available runway length	= 7500
G.	Minimum AB blowout speed	= 86 KIAS

If an AB blowout occurs before reaching 86 KIAS, takeoff cannot be continued.

TAKEOFF ROLL TRIM WITH ASYMMETRIC STORES

Roll trim may be set prior to takeoff with asymmetric stores to prevent wing drop after lift-off. A roll trim input will cause one TEF to be less than full down; therefore, takeoff speed should be increased by 2 knots for each dot of roll trim applied in order to compensate for reduced lift. Takeoff distance increases proportionately to the speed increase. The roll trim required for various combinations of takeoff speed and store asymmetry is shown in figure A2-13.

REFER TO FIGURE A2-13.

Enter chart with corrected takeoff speed (A), project upward to asymmetric store weight (B) and horizontally to the store station baseline, and follow the guidelines to the store station at which the asymmetric load is present (C). From (C), project horizontally to read dots of roll trim required at (D).

SAMPLE PROBLEM.

A.	Corrected takeoff speed	= 151 KIAS
B.	Asymmetric store weight	= 800 pounds
C.	Asymmetric store station	= 3
D.	Dots of roll trim required	= Approximately 2, right wing down

TAKEOFF AND LANDING CROSSWIND LIMITS

Figure A2-14 is to be used to resolve reported wind velocity into headwind and crosswind components. Crosswind component limits for takeoff and landing are also shown.

REFER TO FIGURE A2-14.

Enter chart at the point where reported windspeed intersects wind direction relative to runway (A). Project down to read crosswind (B) and project to the left to read headwind (C).

SAMPLE PROBLEM.

A.	Windspeed	= 15 knots
	Wind direction relative to runway	= 48 degrees
B.	Crosswind	= 11.1 knots
C.	Headwind	= 10 knots

BRAKE ENERGY LIMITS - MAXIMUM EFFORT BRAKING

Heat energy is absorbed in the brake discs when wheel brakes are used. Brake disc temperature increases in direct proportion to the amount of energy absorbed. For normal aircraft operations, almost all the heat energy absorbed during brake usage is temporarily stored in the brake discs and is dissipated during a subsequent cooling period. As an example, the energy absorbed during an approximate 15-second brake application as part of a normal landing is not completely dissipated for more than 1 hour after the aircraft is stopped. The heat energy transferred to the tire/wheel assembly and the brake piston housing causes the temperature of those units to increase to a peak temperature 10-20 minutes after brake usage. Greater amounts of brake energy absorption cause higher disc temperatures and produce faster heat transfer to the tire/wheel assembly and brake piston housing. Since the strength of the brake discs, tire/wheel assembly, and brake piston housing decreases as the temperature increases, the severity of brake usage that can be safely withstood is dependent on brake component temperatures.

REFER TO FIGURE A2-15.

SAMPLE PROBLEM.

Condition: Full stop landing followed by 10,000 feet taxi

Given: GW = 19,000 pounds
Brake application speed = 80 KIAS
Pressure altitude = 2000 feet
Outside air temp = 78°F (26°C)
Taxi distance = 10,000 feet
Taxi speed = 20 knots groundspeed

Find: Brake energy absorbed

Determine: Quick turnaround capability

Solution:

(a) Enter chart at 19,000 pounds GW, follow vertical line downward to 80 KIAS brake application speed, and project horizontally to the right edge of weight/brake application speed plot. Follow guidelines upward to the right.

(b) Enter chart at 78°F (26°C) air temperature, follow horizontal line to the left to 2000 feet pressure altitude, and project a line vertically downward until it intersects the line constructed in step (a). From this intersection point, project a line horizontally to the right to read 2.8 million foot-pounds per brake stopping energy.

(c) To compute taxi energy component, continue downward projection of vertical line for 19,000 pounds GW until it intersects 20 knots taxi speed; then project horizontally to the right until it intersects the taxi distance; then project vertically upward to read 1.4 million foot-pounds taxi energy absorption per brake.

(d) The cumulative total stopping energy plus taxi energy is determined by continuing the projections of the lines for stopping energy and taxi energy until they intersect at 4.2 million foot-pounds per brake.

(e) Quick turnaround takeoff capability can be determined by using the Safe Tire Bead Temperature chart (figure A2-16). Enter with the cumulative total stopping energy plus taxi brake energy absorption of 4.2 million foot-pounds per brake. Project horizontally to right to intersect vertical line representing ambient temperature. This intersection shows no cooling period required.

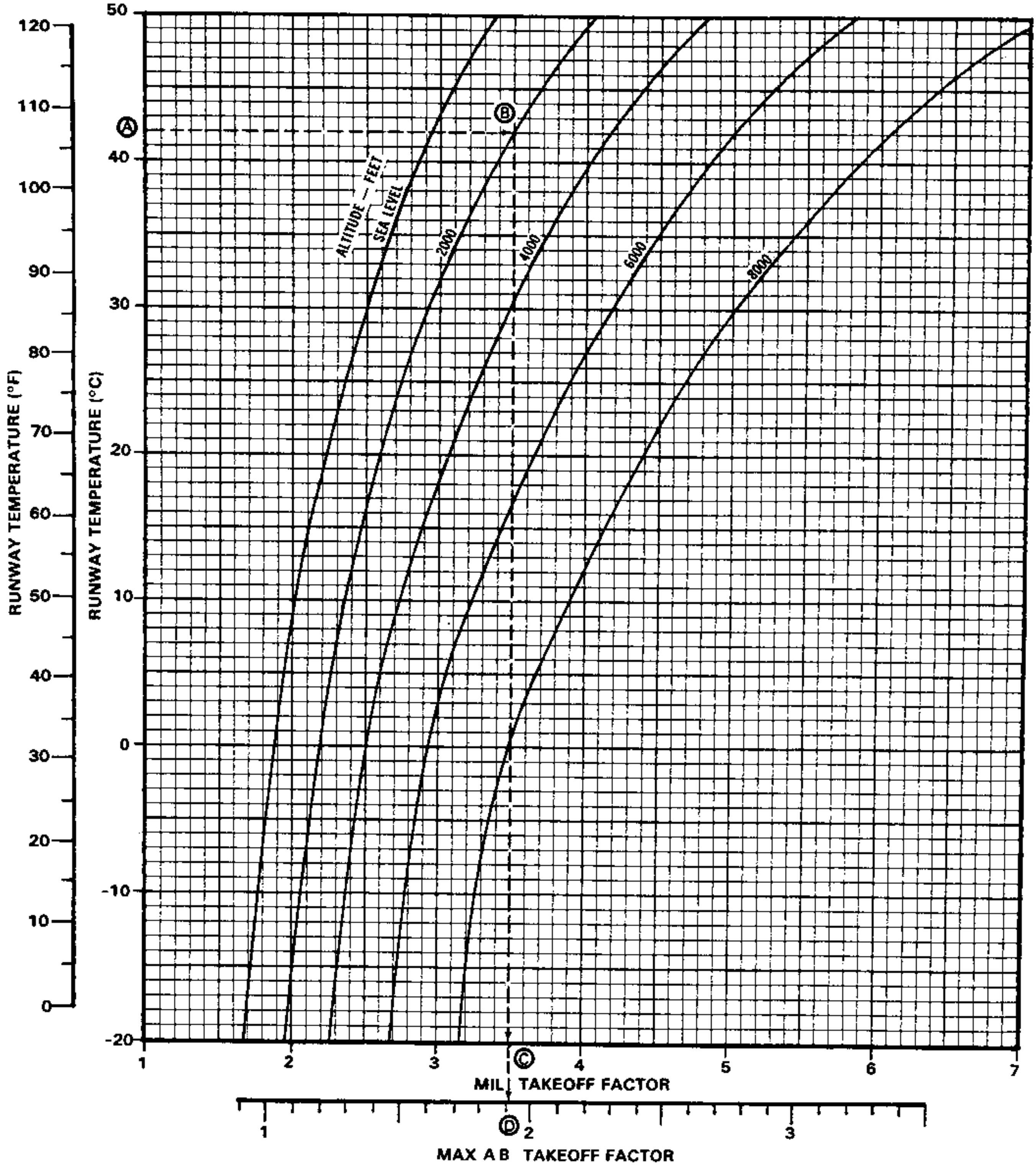
ABORTED TAKEOFF MAXIMUM BRAKE APPLICATION SPEED

Figure A2-15 can also be used for finding the maximum brake application speed for aborted takeoff considering taxi energy absorbed prior to starting takeoff run. This is accomplished by computing the taxi energy and projecting this value vertically upward to the intersection of the danger zone upper limit (18.2 million foot-pounds per brake). From this intersection, project horizontally to the left to the remaining brake energy capacity available for stopping during aborted takeoff. The maximum brake application speed can then be found for the prevailing conditions of GW, pressure altitude, and temperature. If brakes must be applied prior to complete thrust decay to idle (approximately 4 seconds), maximum brake application speed must be reduced by 20 KIAS.

Takeoff Factor

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200



1F-16X-1-0222

Figure A2-1.

Takeoff Speed (MIL or MAX AB) LESS 47

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONFIGURATION:
- ALL DRAG INDICES

CONDITIONS:
- ALL TEMPERATURES
- ALL ALTITUDES
- TAKEOFF AT 12 DEGREES PITCH ATTITUDE

NOTES:
- BREAK IN SPEED/WEIGHT SCALE AT 28,000 POUNDS IS CAUSED BY CG (REFER TO TEXT)
- FOR TAKEOFF CG GREATER THAN 38 PERCENT MAC, USE CORRECTED TAKEOFF SPEEDS AT 38 PERCENT MAC
- ROTATE AT 15 KNOTS LESS THAN CORRECTED TAKEOFF SPEED

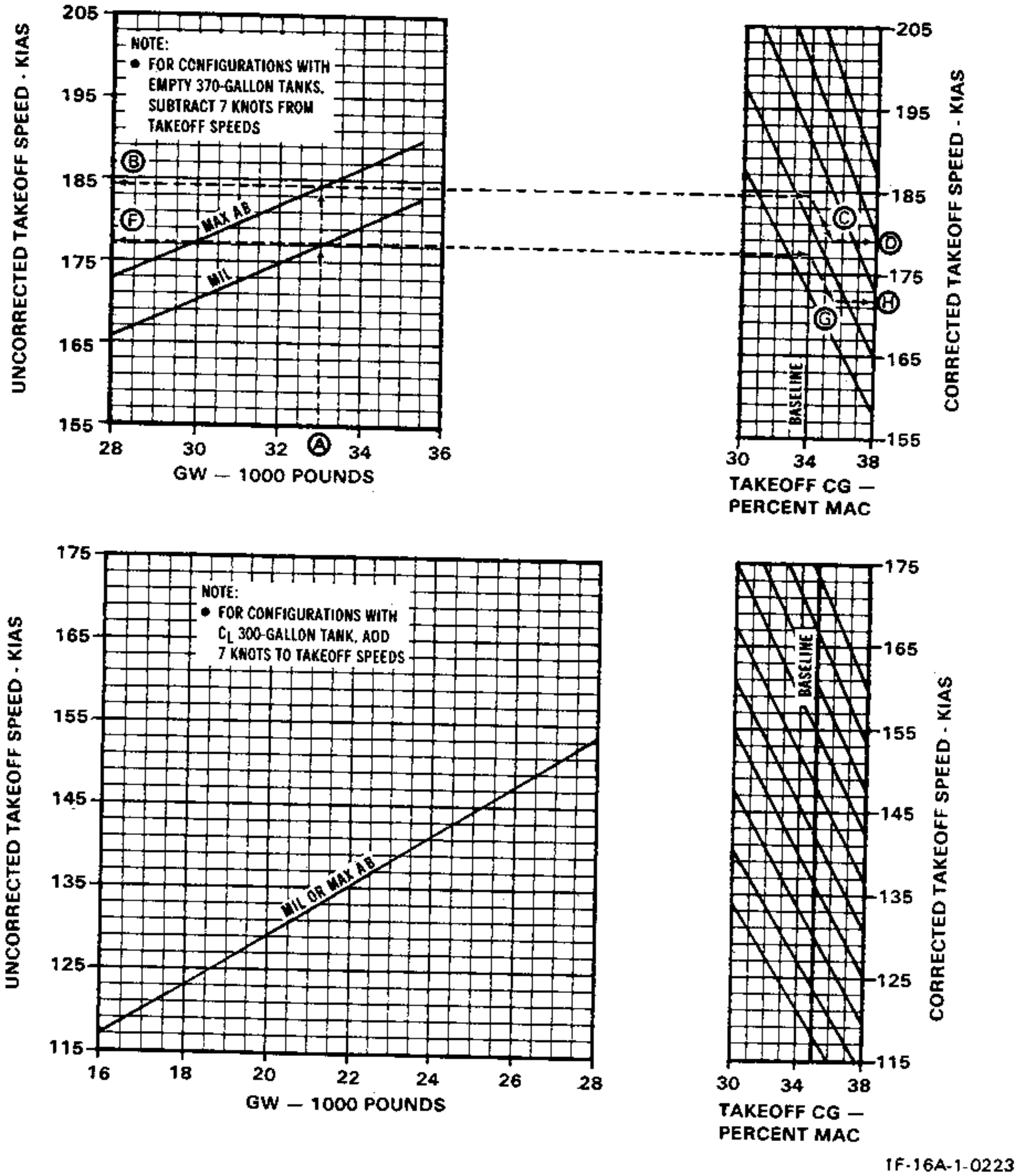


Figure A2-2. (Sheet 1)

Takeoff Speed (MIL or MAX AB) 47

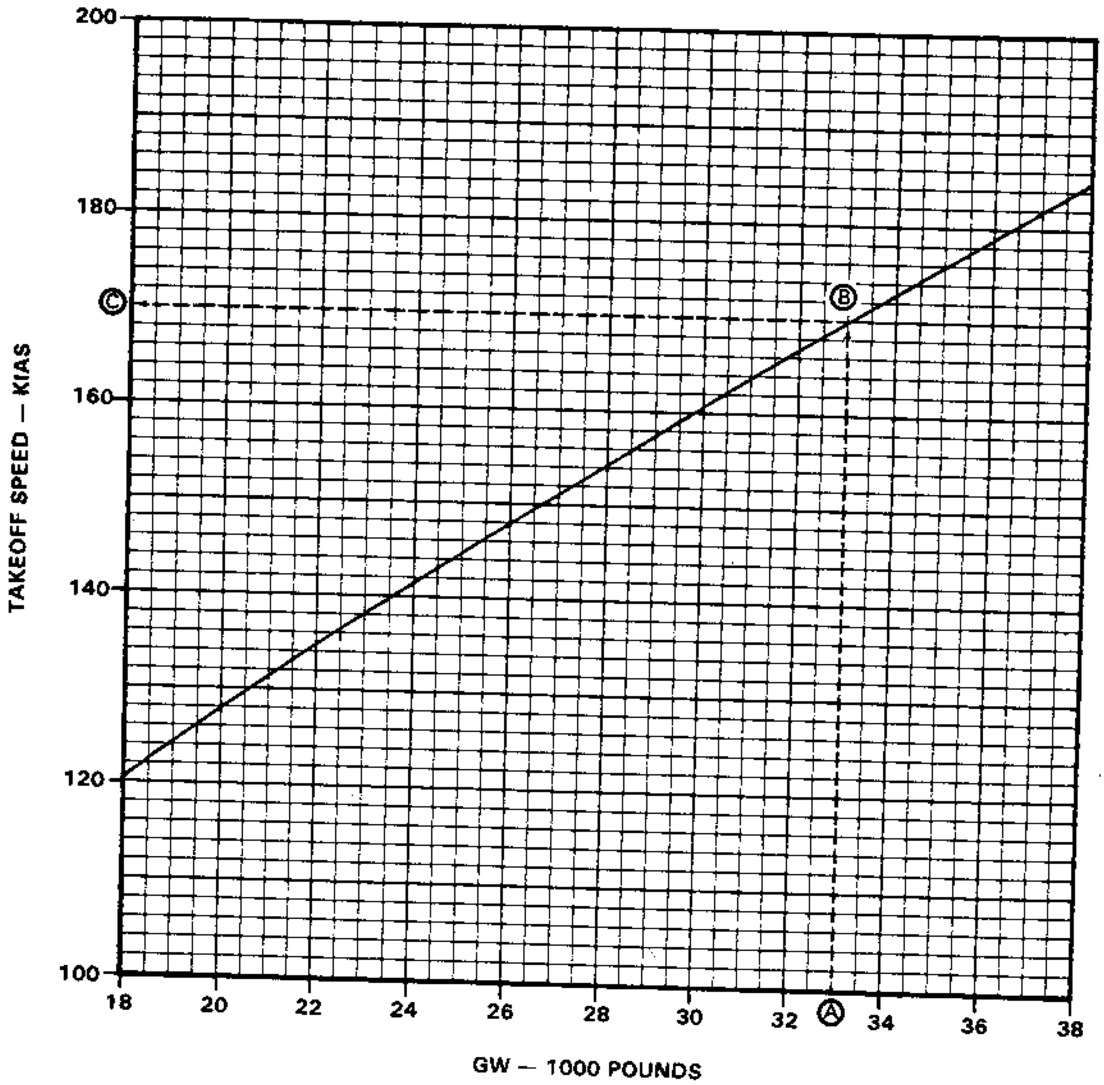
DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- ALL DRAG INDICES
- CG = 35% MAC

CONDITIONS:
- ALL ALTITUDES
- ALL TEMPERATURES
- 12 DEGREES PITCH ATTITUDE

NOTES:
- ROTATE AT 10 KNOTS LESS THAN COMPUTED TAKEOFF SPEED FOR MIL
- ROTATE AT 15 KNOTS LESS THAN COMPUTED TAKEOFF SPEED FOR MAX AB
- INCREASE TAKEOFF SPEED 6 PERCENT FOR TAKEOFF AT 10 DEGREES PITCH ATTITUDE
- INCREASE TAKEOFF SPEED 0.8 KNOTS FOR EACH 1% FORWARD OF 35% MAC
- DECREASE TAKEOFF SPEED 0.8 KNOTS FOR EACH 15 AFT OF 35% MAC



1F-16X-1-0485

Figure A2-2. (Sheet 2)

Takeoff Distance (Uncorrected) LESS 47

DATA BASIS: FLIGHT TEST **ENGINE:** F100-PW-200

CONDITIONS:

- LIFTOFF AT UNCORRECTED TAKEOFF SPEED

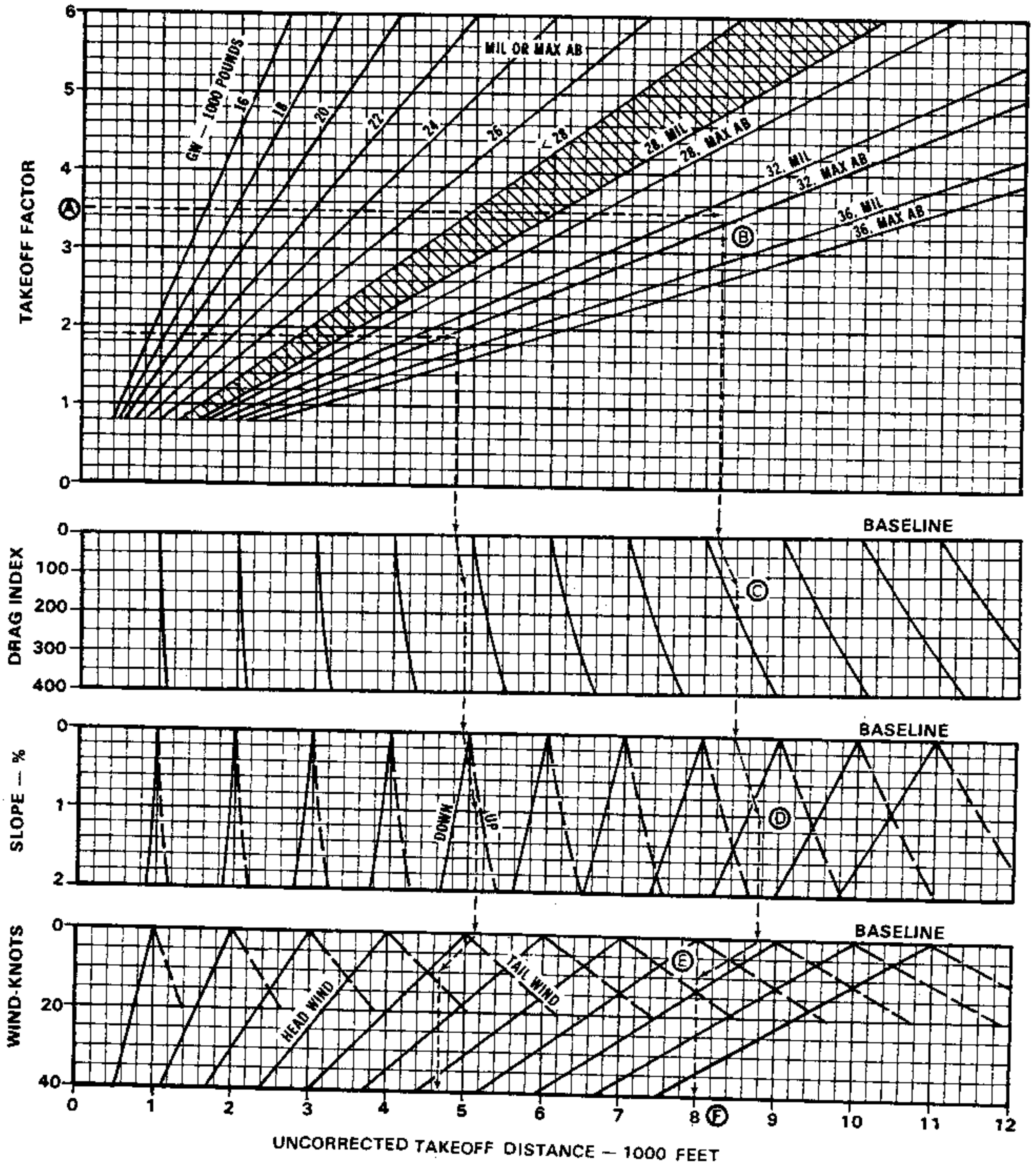


Figure A2-3. (Sheet 1)

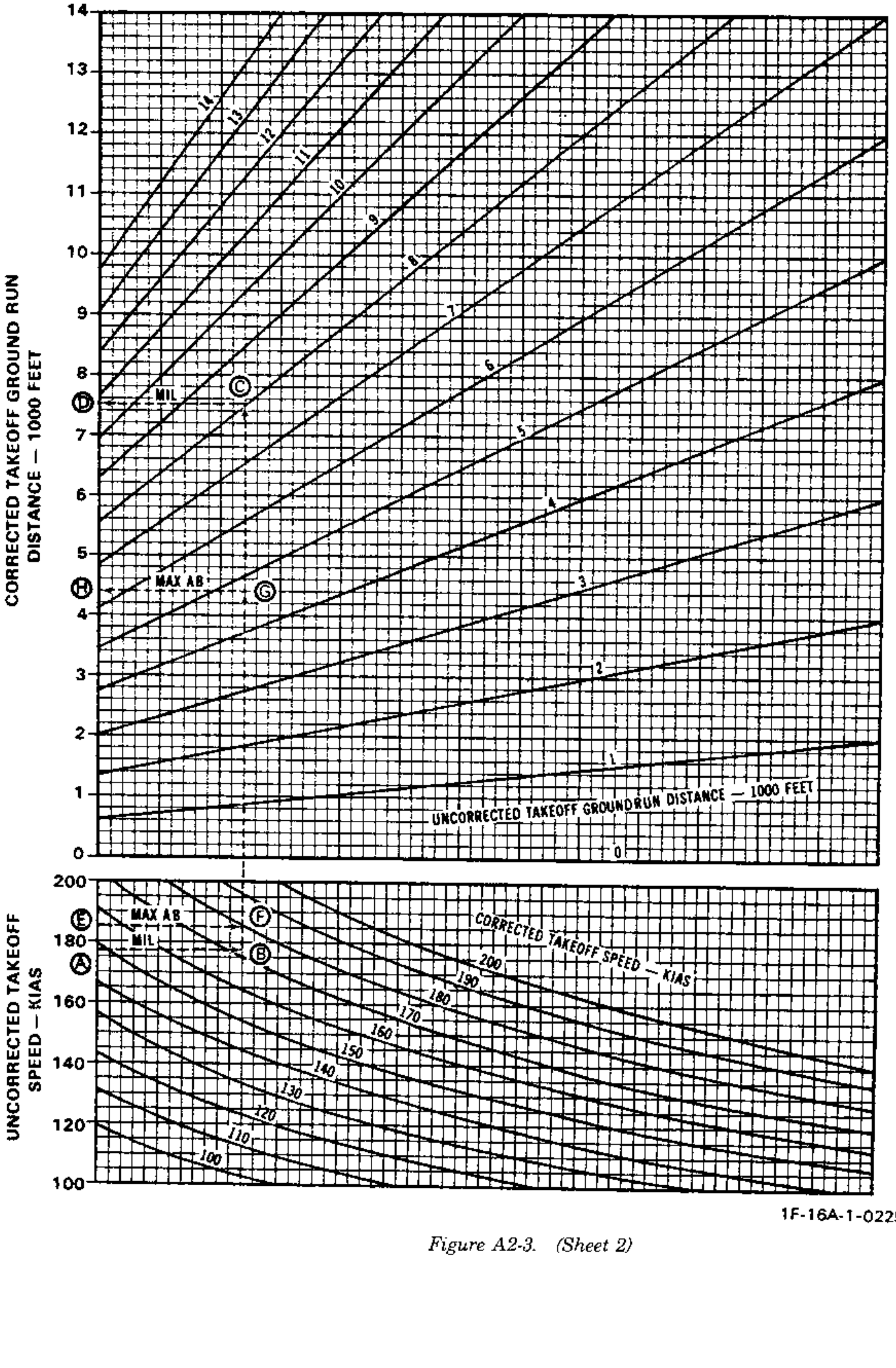
Takeoff Distance (Corrected) LESS 47

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONDITIONS:

- LIFTOFF AT CORRECTED TAKEOFF SPEED



1F-16A-1-0225

Figure A2-3. (Sheet 2)

Takeoff Distance (MIL or MAX AB) 47

DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONDITIONS:
- LIFTOFF AT TAKEOFF SPEED
- 12 DEGREES PITCH ATTITUDE

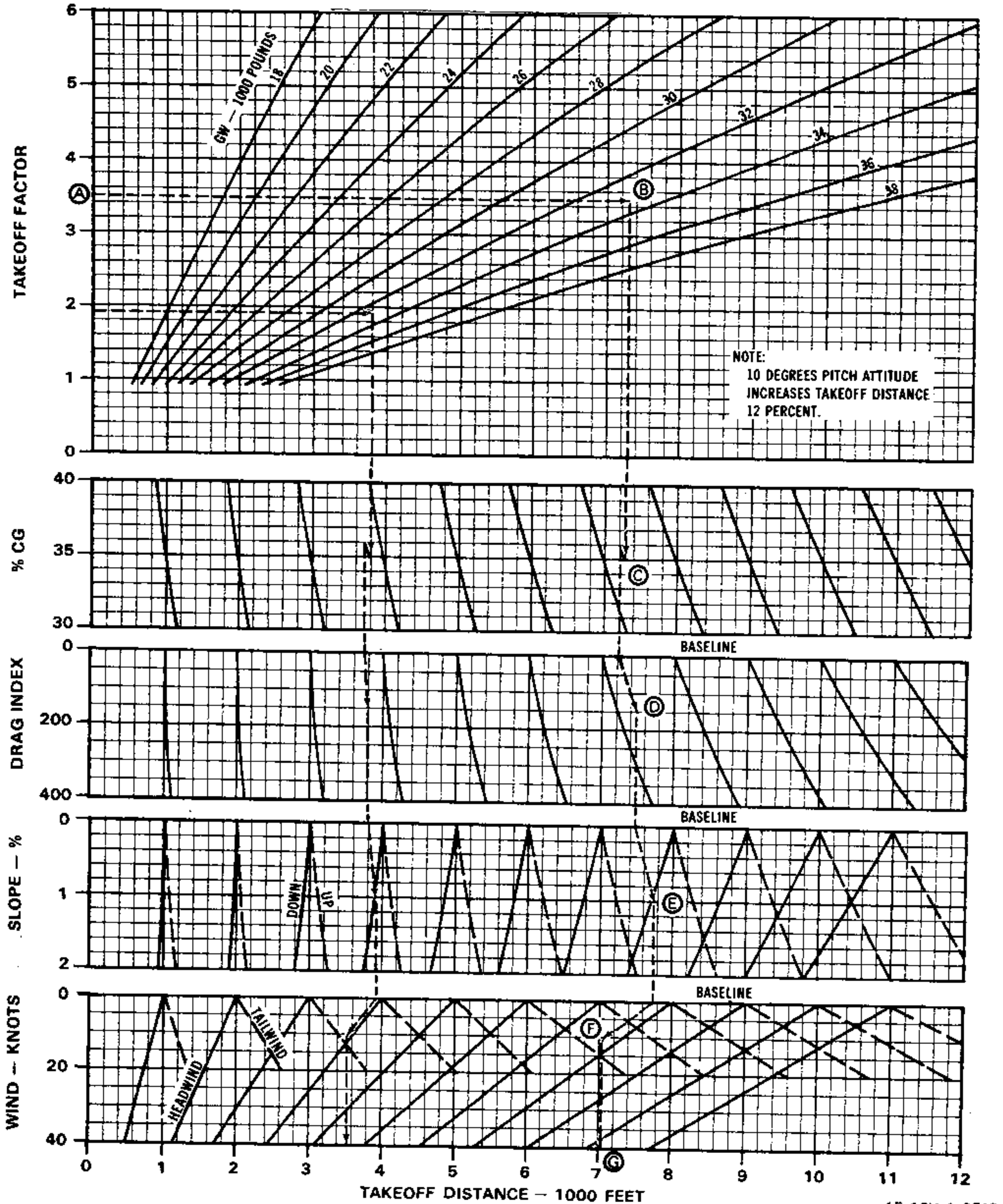


Figure A2-3. (Sheet 3)

Acceleration Check Speed

DATA BASIS: FLIGHT TEST **ENGINE: F100-PW-200**

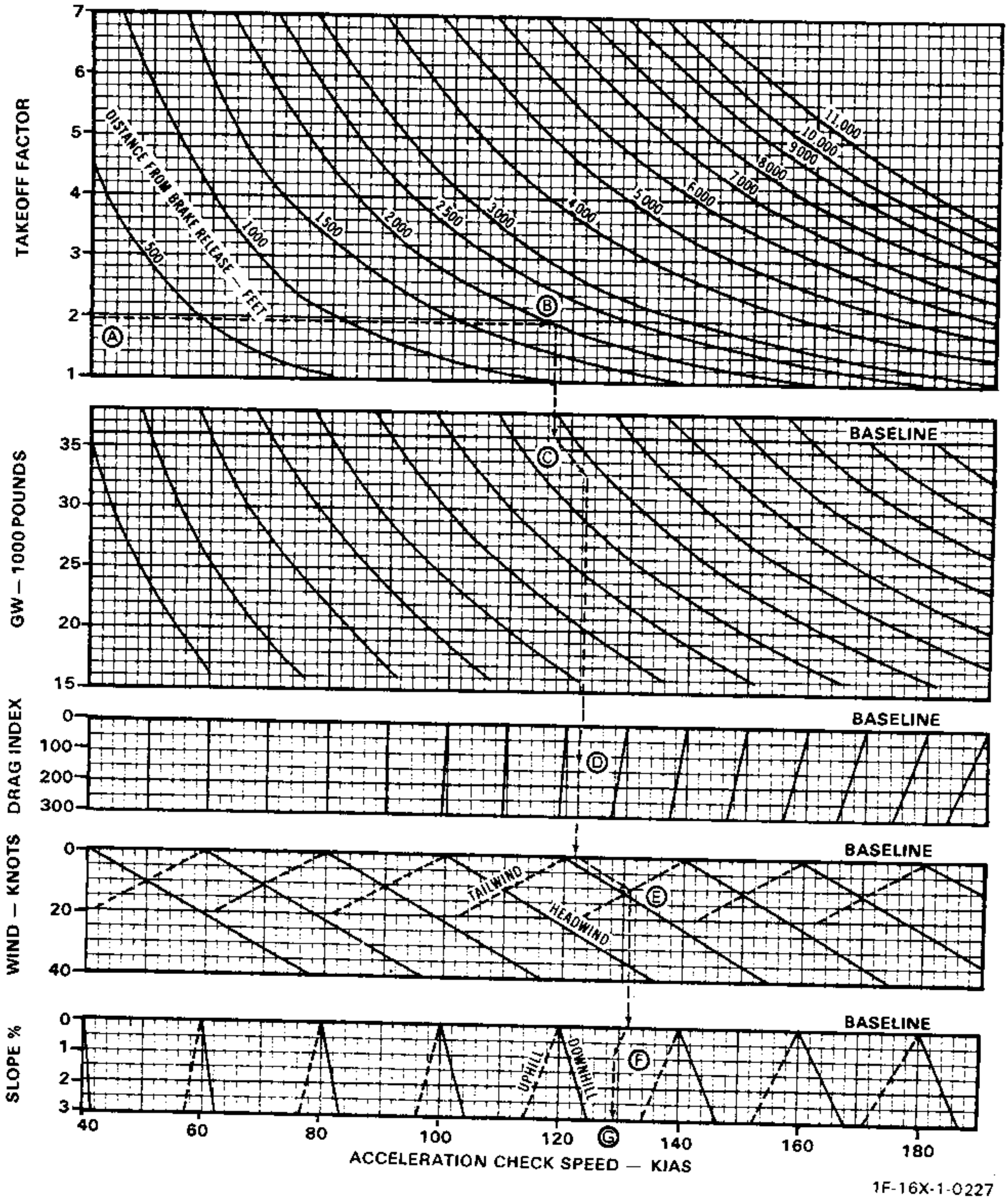


Figure A2-4.

Refusal Speed (MIL)

DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:

- ALL DRAG INDICES
- SPEEDBRAKES - OPEN

CONDITIONS:

- IDLE SELECTED AT REFUSAL SPEED
- MAX EFFORT BRAKING
- DRY CONCRETE

NOTES:

- REFUSAL SPEED BASED ON:
  - ZERO TAXI ENERGY
  - NO BRAKING ABOVE MAX BRAKE APPLICATION SPEED (REFER TO FIGURE A2-15)

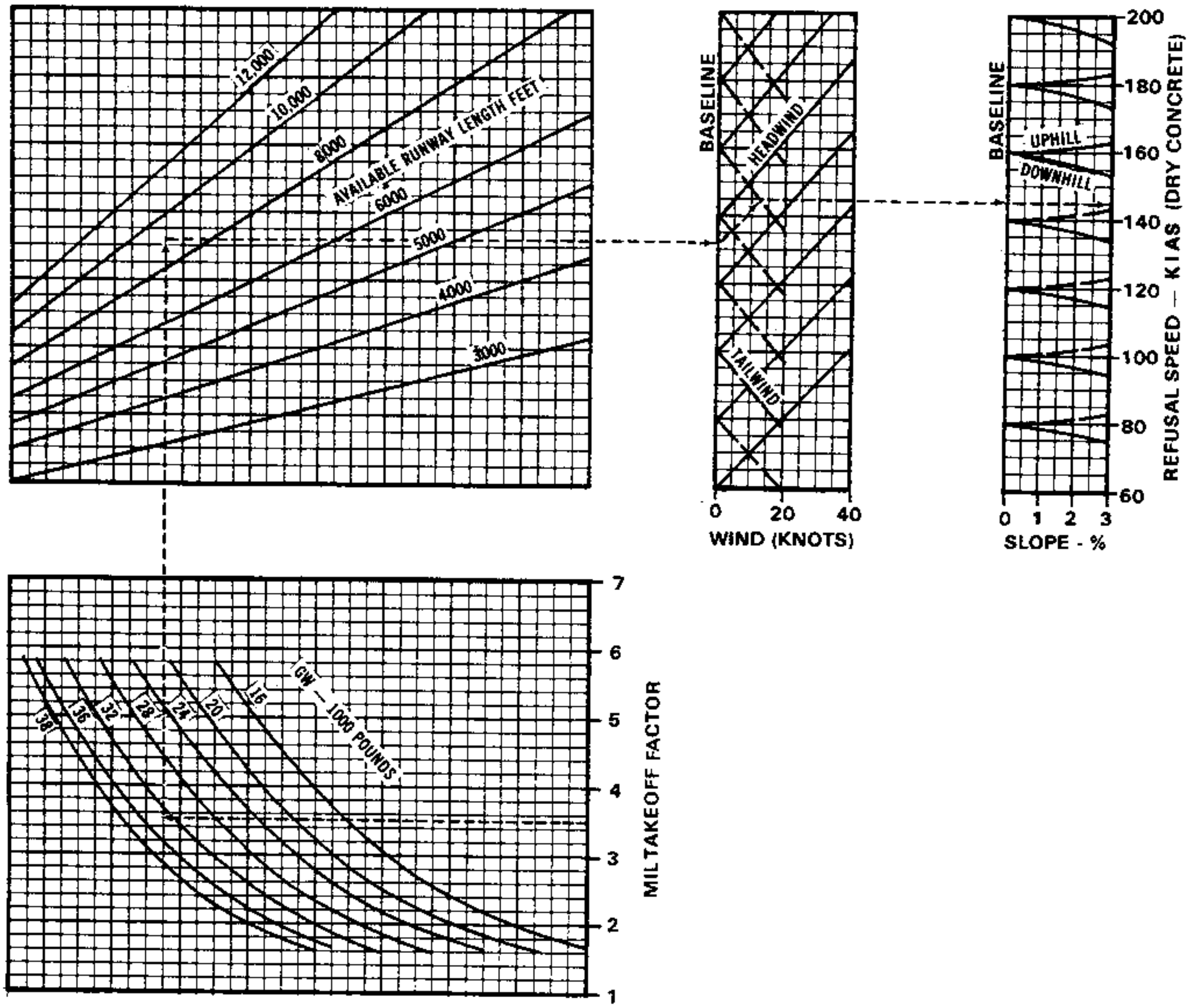


Figure A2-5.

1F-16X-1-0228

Effect of Runway Condition on Refusal Speed (MIL)

DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- ALL DRAG INDICES
- SPEEDBRAKES - OPEN

CONDITIONS:
- IDLE SELECTED AT REFUSAL SPEED
- MAX EFFORT BRAKING

NOTE: OBSERVE MAXIMUM BRAKE APPLICATION SPEED ON DRY CONCRETE (RCR = 23). APPLY BRAKES IMMEDIATELY ON ALL OTHER SURFACES.

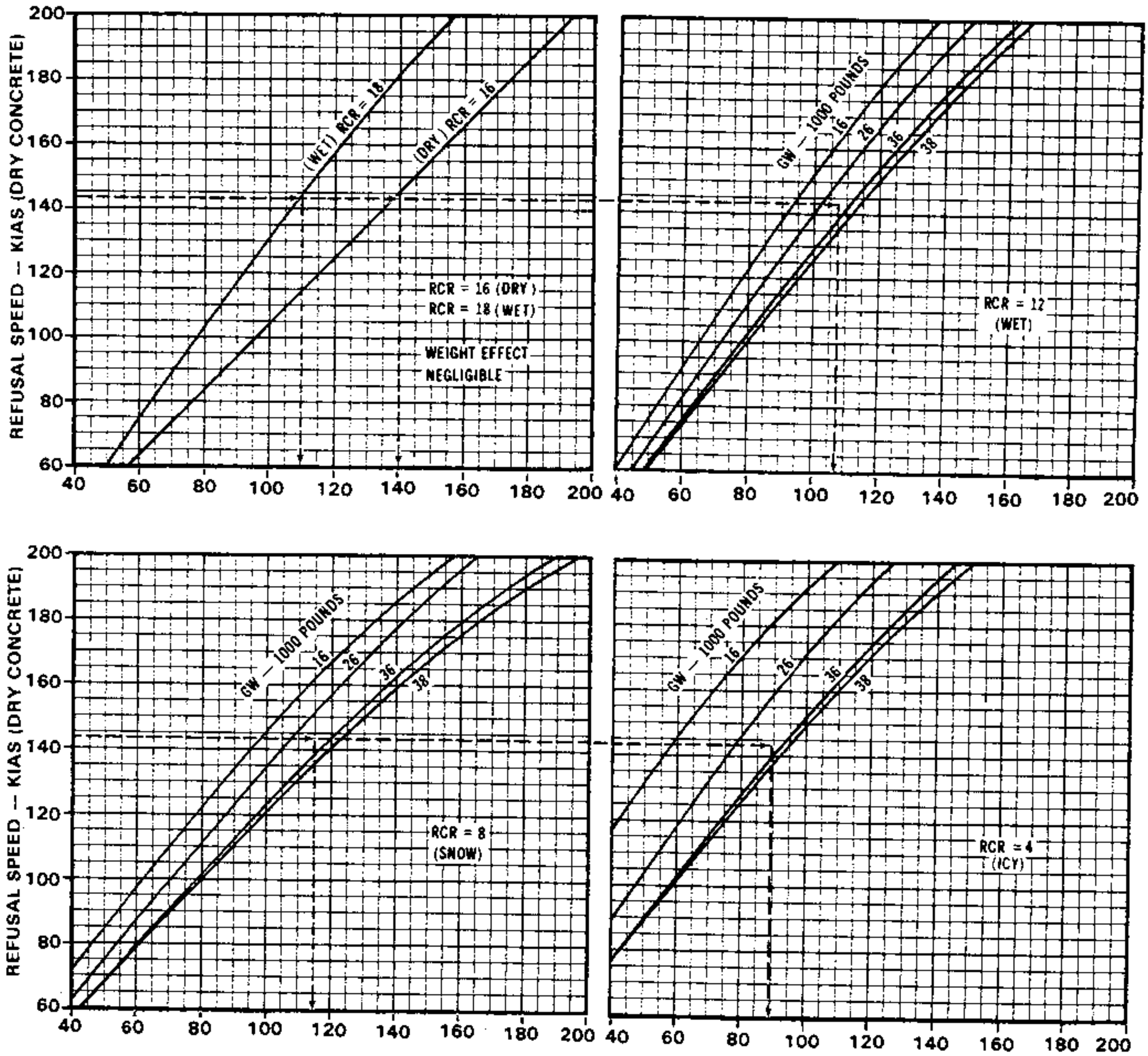


Figure A2-6.

1F-16X-1-0229

Refusal Speed (MAX AB)

DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:

- ALL DRAG INDICES
- SPEEDBRAKES - OPEN

CONDITIONS:

- IDLE SELECTED AT REFUSAL SPEED
- MAX EFFORT BRAKING
- DRY CONCRETE

NOTES:

- REFUSAL SPEED BASED ON:
  - ZERO TAXI ENERGY
  - NO BRAKING ABOVE MAX BRAKE APPLICATION SPEED (REFER TO FIGURE A2-15)

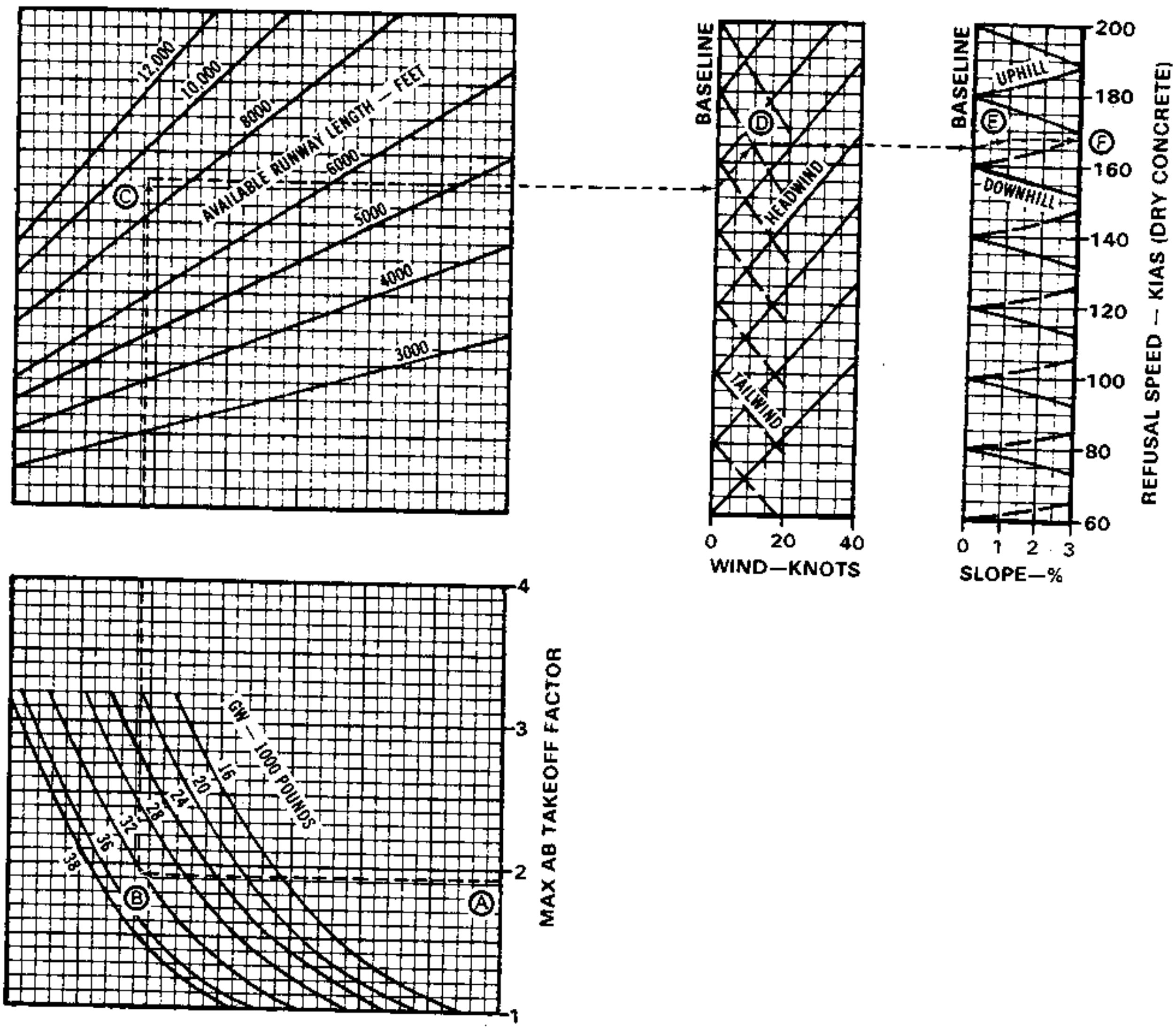


Figure A2-7.

1F-16X-1-0230

Effect of Runway Condition on Refusal Speed (MAX AB)

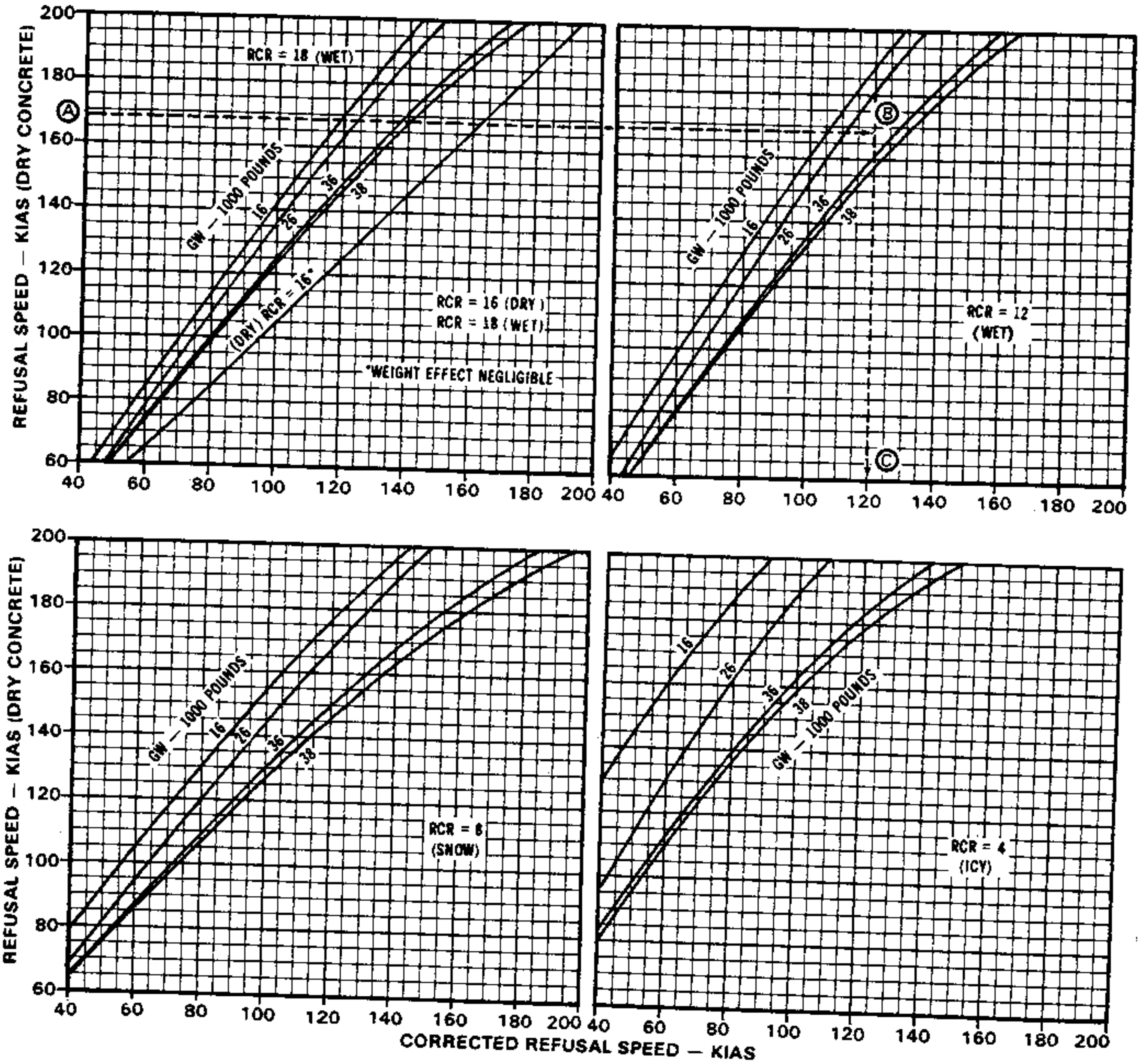
DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- ALL DRAG INDICES
- SPEEDBRAKES - OPEN

CONDITIONS:
- IDLE SELECTED AT REFUSAL SPEED
- MAX EFFORT BRAKING

NOTE: OBSERVE MAXIMUM BRAKE APPLICATION SPEED ON DRY CONCRETE (RCR = 23). APPLY BRAKES IMMEDIATELY ON ALL OTHER SURFACES.



1F-16X-1-0231

Figure A2-8.

Refusal Speed With Drag Chute (MIL) NO

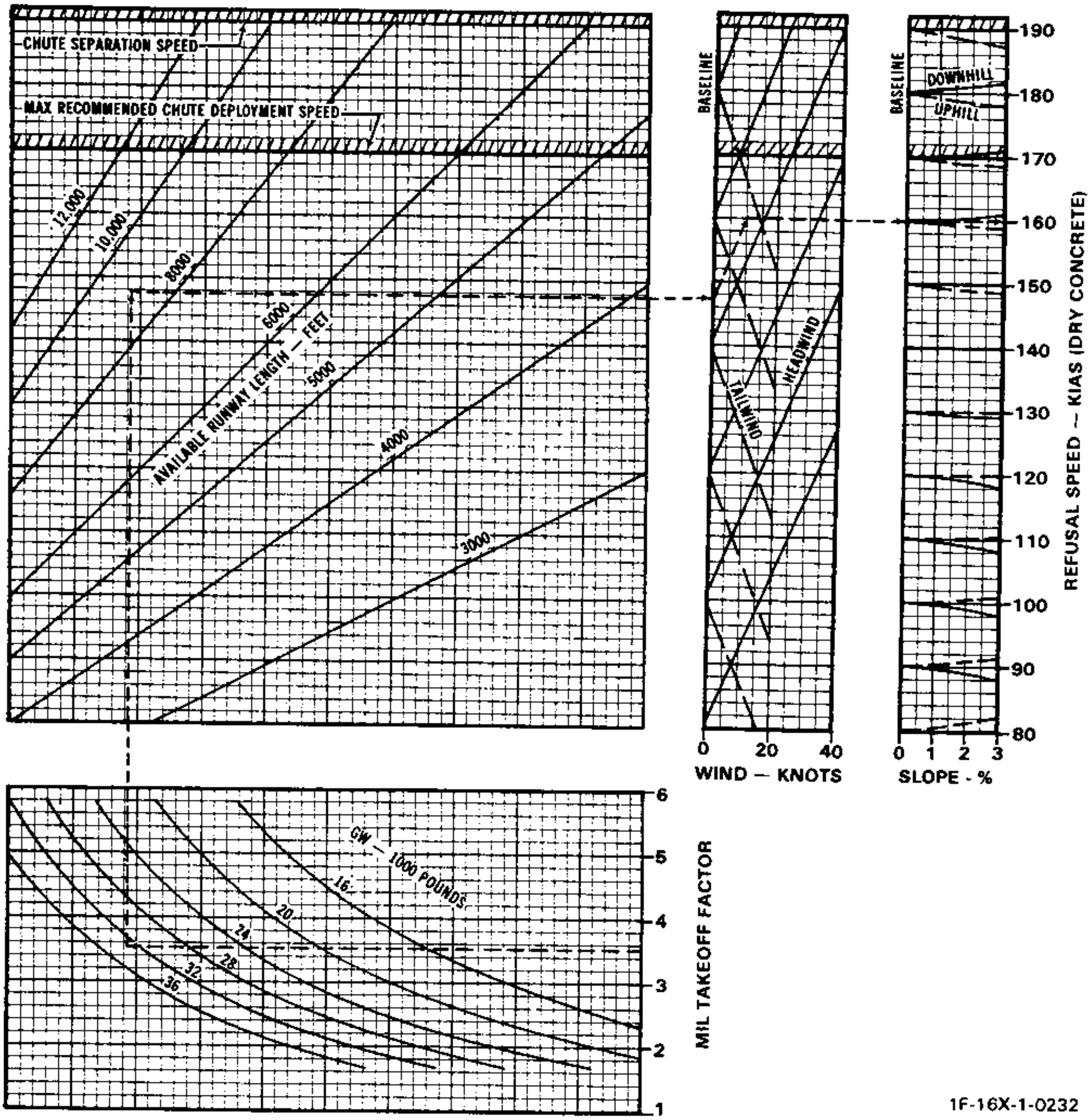
DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- ALL DRAG INDICES
- SPEEDBRAKES - OPEN
- DRAG CHUTE - DEPLOYED

CONDITIONS:
- IDLE SELECTED AND DRAG CHUTE DEPLOYED AT REFUSAL SPEED
- MAX EFFORT BRAKING
- DRY CONCRETE

NOTES:
- REFUSAL SPEED BASED ON:
  - ZERO TAXI ENERGY
  - NO BRAKING ABOVE MAX BRAKE APPLICATION SPEED (REFER TO FIGURE A2-15)



1F-16X-1-0232

Figure A2-9.

Refusal Speed With Drag Chute (MAX AB) NO

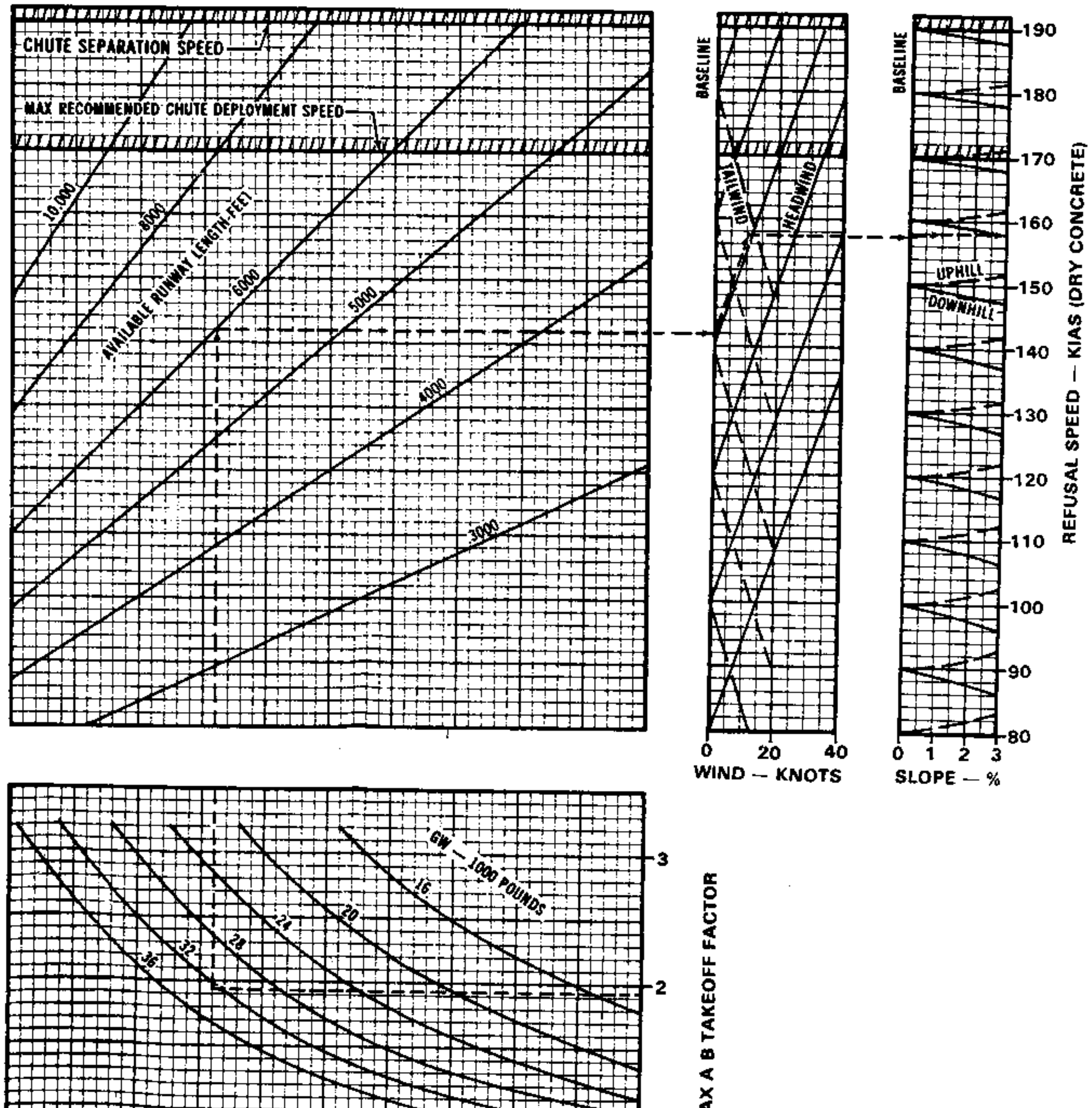
DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

NOTES:
- REFUSAL SPEED BASED ON:
  - ZERO TAXI ENERGY
  - NO BRAKING ABOVE MAX BRAKE APPLICATION SPEED (REFER TO FIGURE A2-15)

CONFIGURATION:
- ALL DRAG INDICES
- SPEEDBRAKES - OPEN
- DRAG CHUTE - DEPLOYED

CONDITIONS:
- IDLE SELECTED AND DRAG CHUTE DEPLOYED AT REFUSAL SPEED
- MAX EFFORT BRAKING
- DRY CONCRETE



1F-16X-1-0233

Figure A2-10.

Effect of Runway Condition on Refusal Speed (Drag Chute Used) NO

DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- ALL DRAG INDICES
- SPEEDBRAKES - OPEN
- DRAG CHUTE - DEPLOYED

CONDITIONS:
- IDLE SELECTED AND DRAG CHUTE DEPLOYED AT REFUSAL SPEED
- MAX EFFORT BRAKING

NOTE: OBSERVE MAXIMUM BRAKE APPLICATION SPEED ON DRY CONCRETE (RCR = 23). APPLY BRAKES IMMEDIATELY ON ALL OTHER SURFACES.

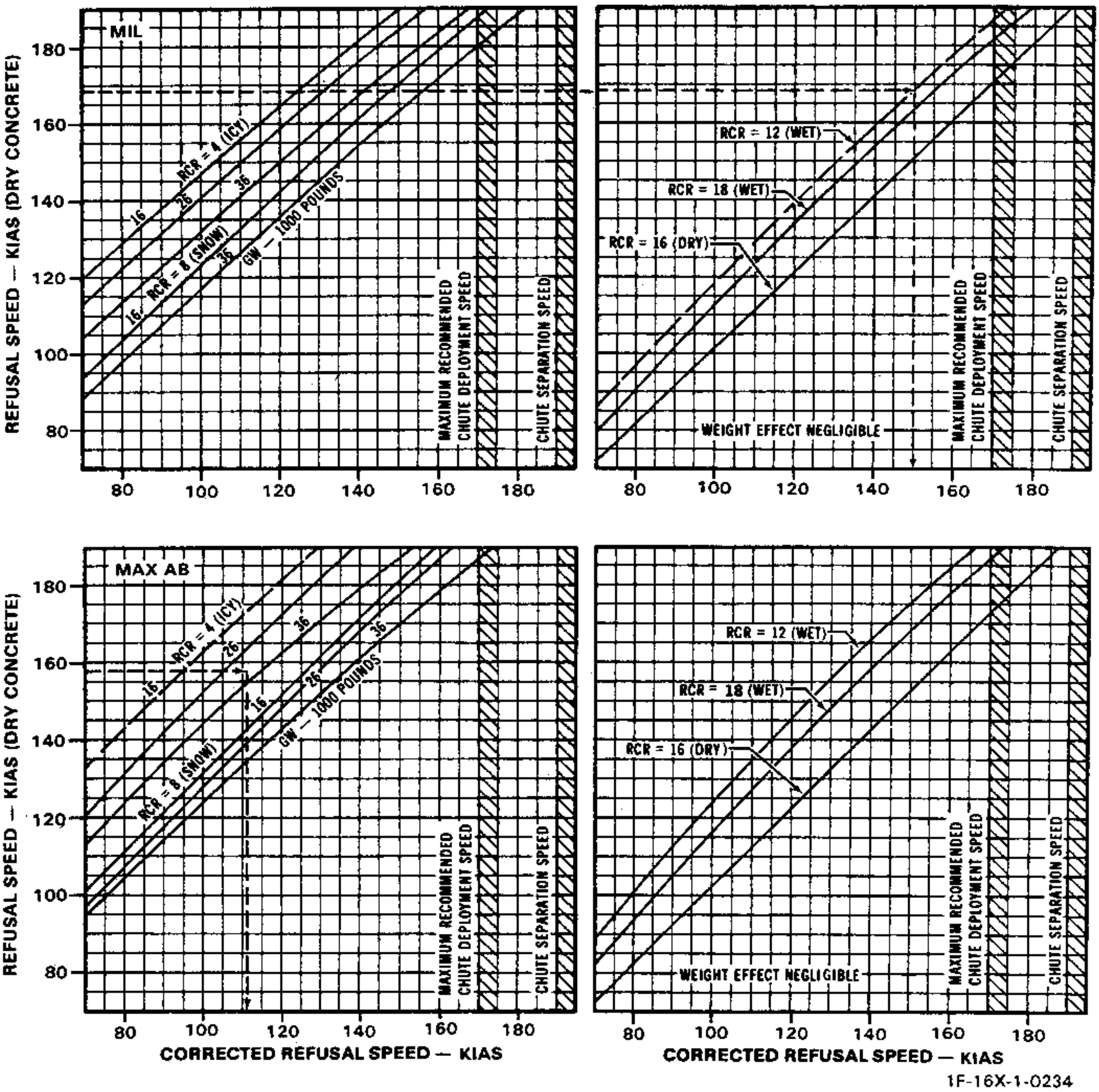


Figure A2-11.

Minimum AB Blowout Speed LESS 47

DATA BASIS: FLIGHT TEST **ENGINE: F100-PW-200**

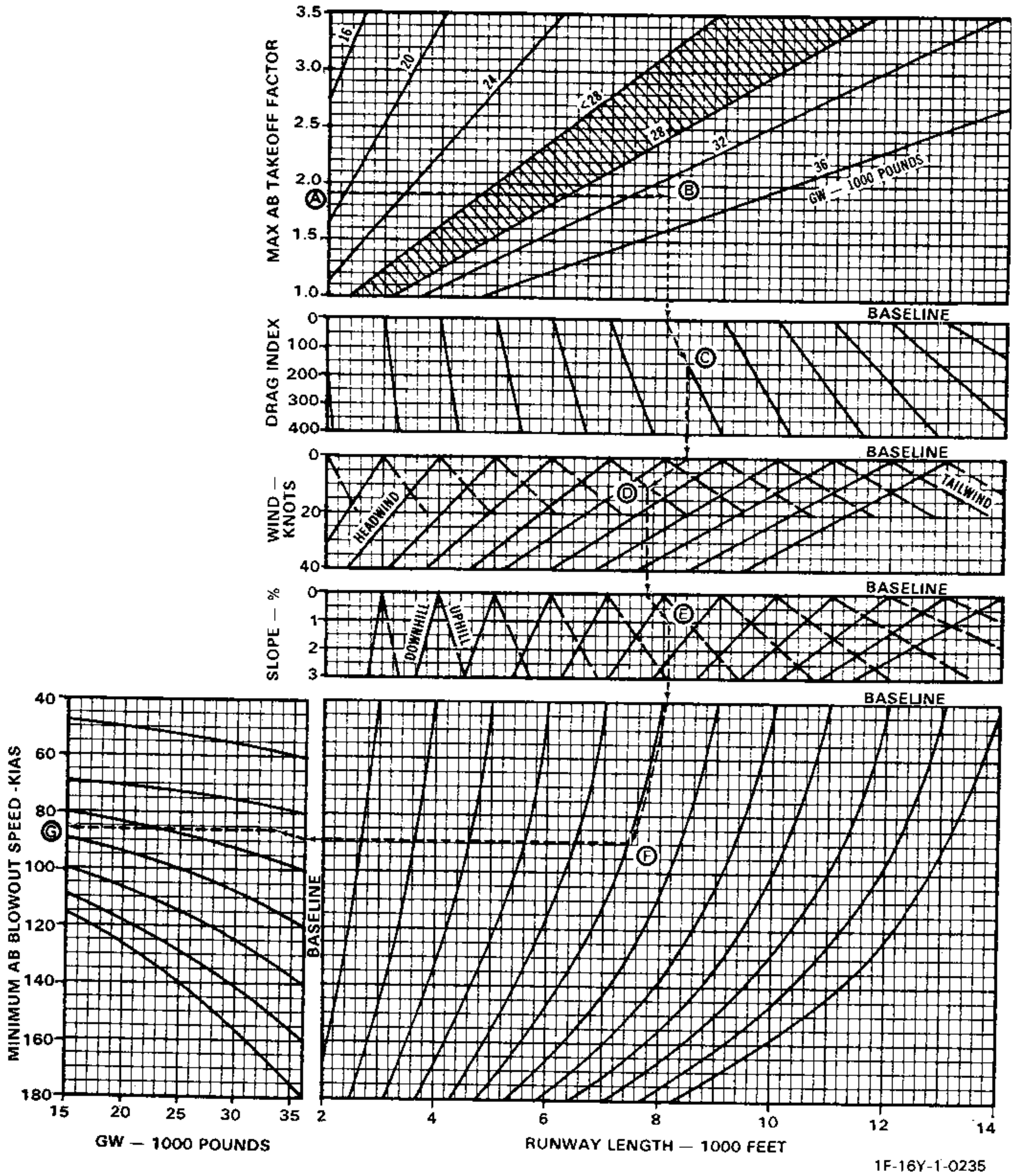


Figure A2-12. (Sheet 1)

Minimum AB Blowout Speed 47

DATA BASIS: FLIGHT TEST **ENGINE: F100-PW-200**

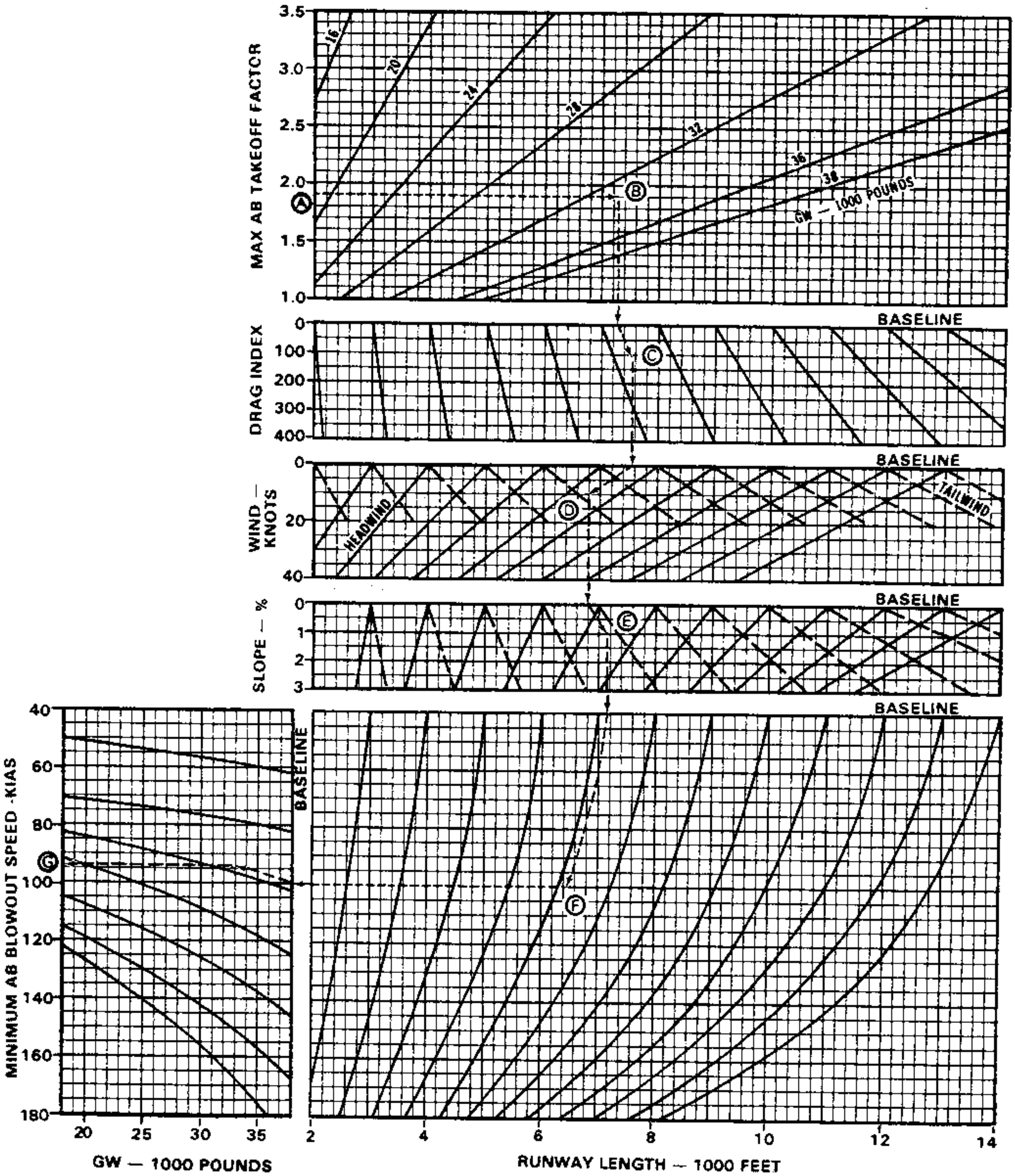


Figure A2-12. (Sheet 2)

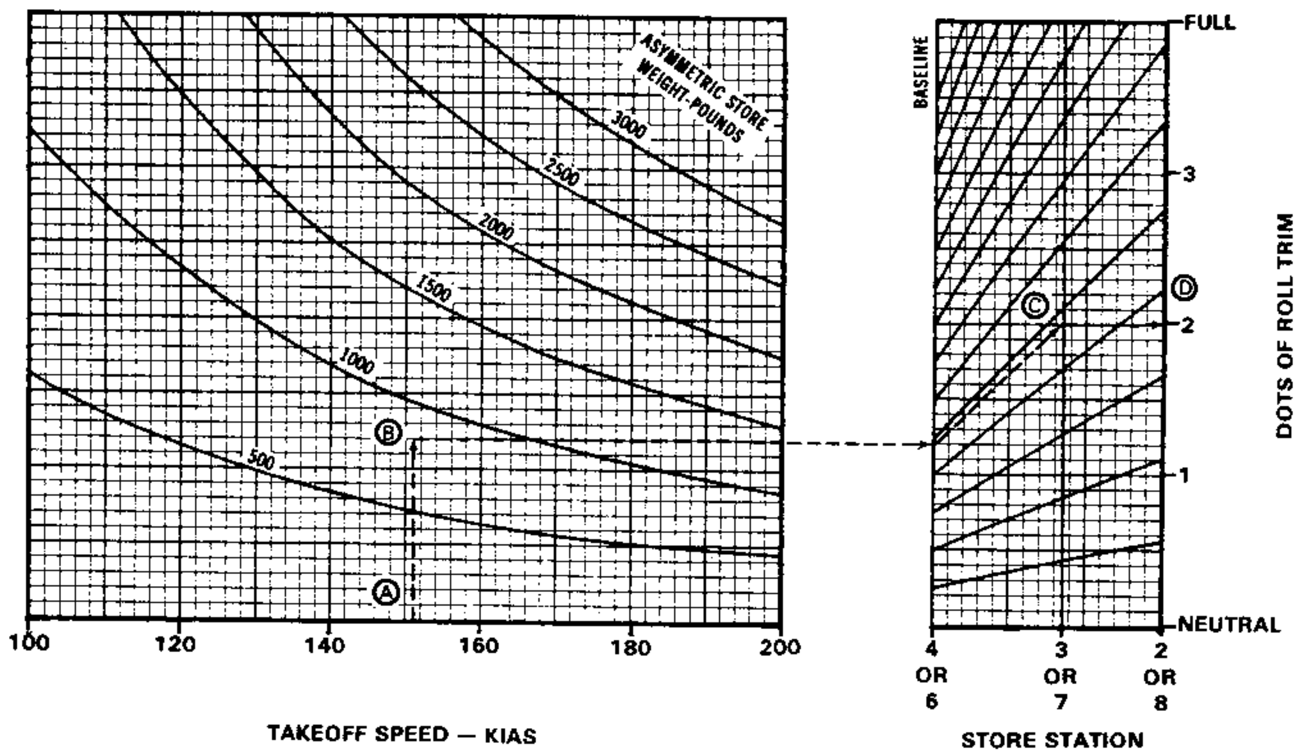
Takeoff Roll Trim With Asymmetric Stores

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONFIGURATION:
- LEF'S SCHEDULED
- TEF'S AT 20 DEGREES

NOTE: TAKEOFF SPEED SHOULD BE INCREASED BY 2 KNOTS FOR EACH DOT OF ROLL TRIM APPLIED TO COMPENSATE FOR REDUCED LIFT.

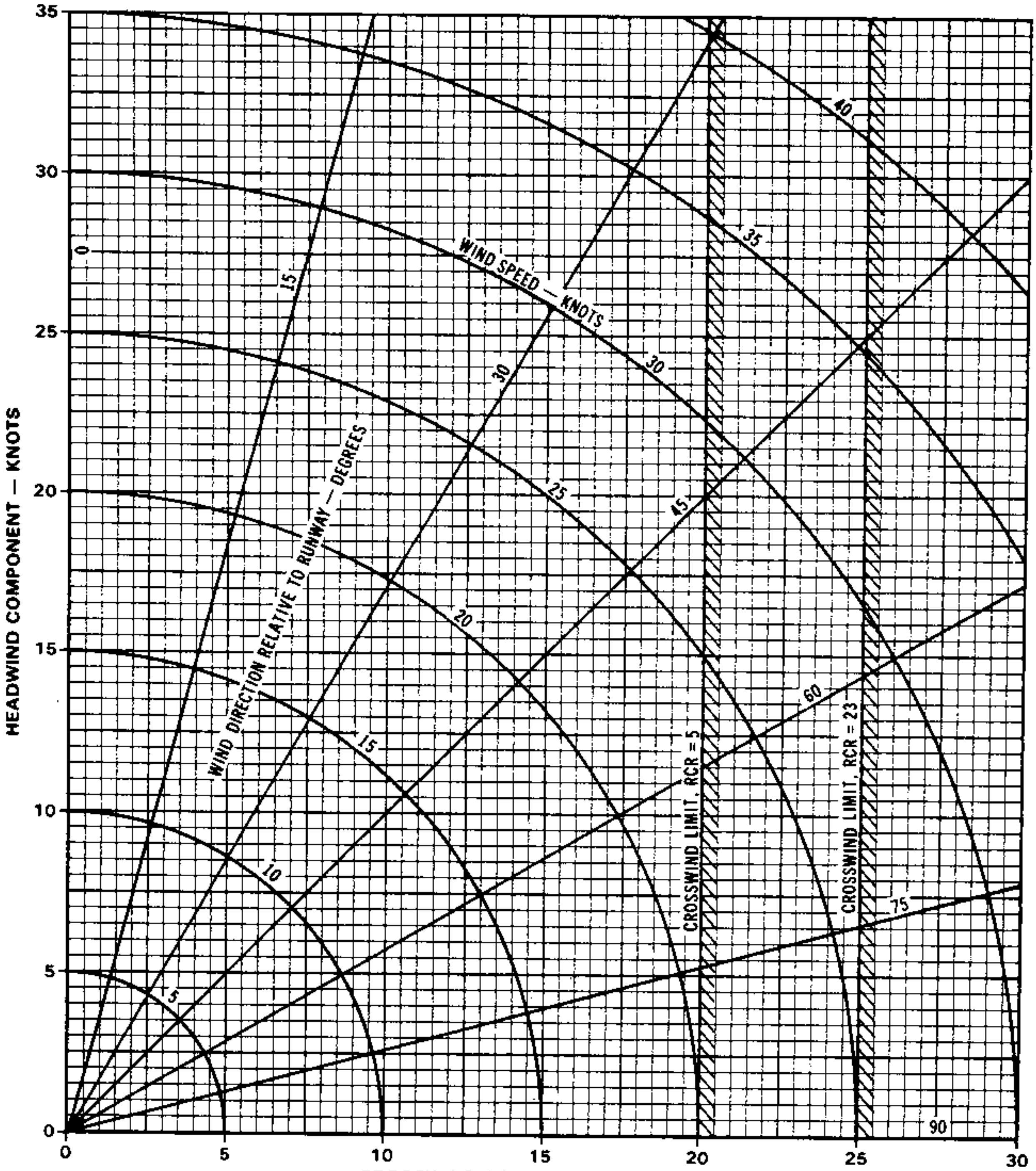


1F-16X-1-0236

Figure A2-13.

Takeoff and Landing Crosswind Limits

NOTE:
- CROSSWIND LIMITS FOR RCR VALUES 5–23 MAY BE OBTAINED BY INTERPOLATING BETWEEN THE LIMITS SHOWN.
- ENTER CHART WITH STEADY WIND TO DETERMINE HEADWIND COMPONENT AND WITH MAXIMUM GUST VELOCITY TO DETERMINE CROSSWIND COMPONENT.



1F-16X-1-0170

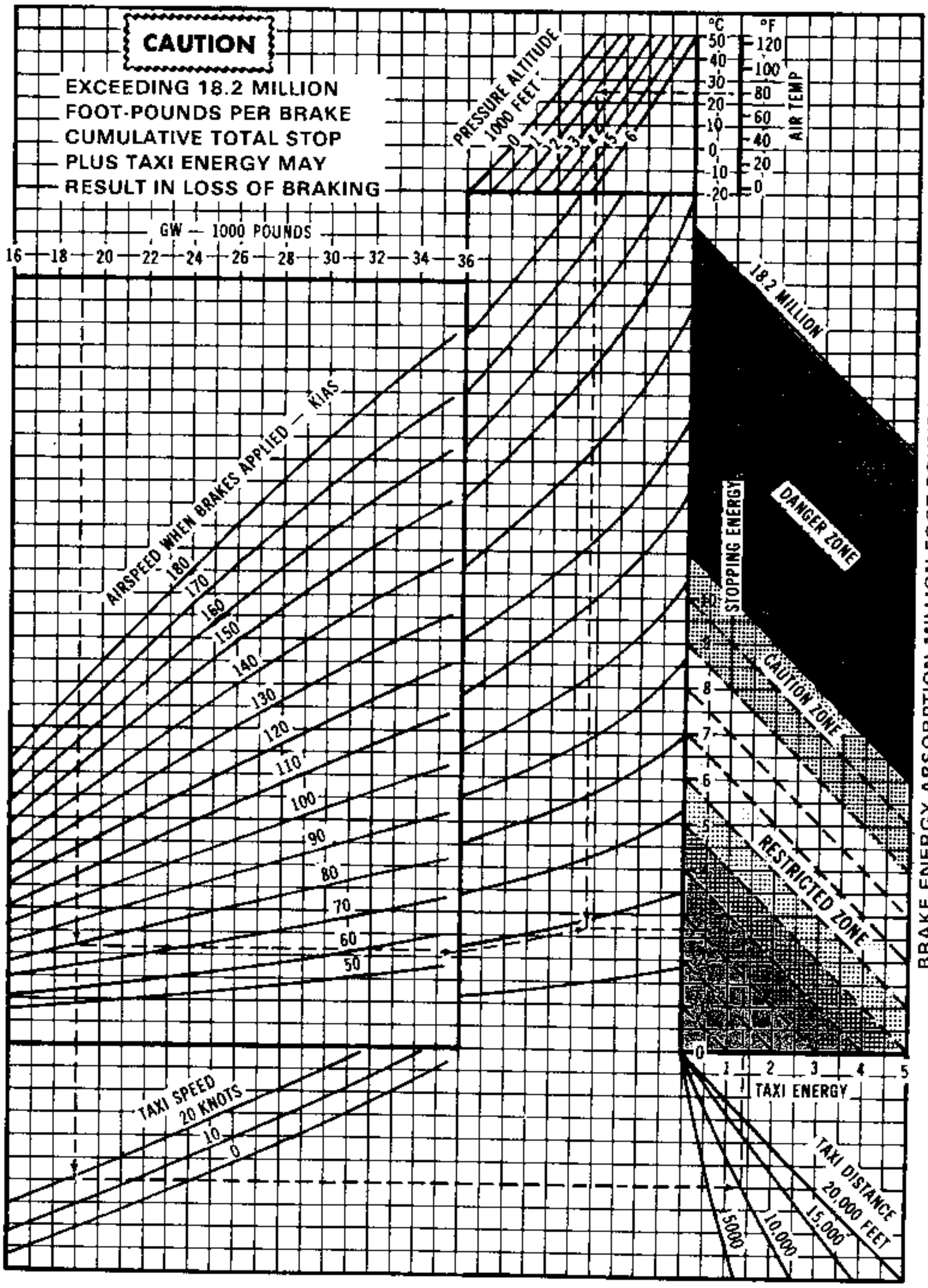
Figure A2-14.

Brake Energy Limits — Max Effort Braking

CONFIGURATION:
- ALL DRAG INDICES
- SPEEDBRAKES - OPEN
- TEF's DOWN

CONDITIONS:
- NORMAL IDLE THRUST

NOTES:
- ADD TAILWIND COMPONENT OR SUBTRACT ONE-HALF HEADWIND COMPONENT FROM AIRSPEED WHEN BRAKES ARE APPLIED.
- FOR ABORTED TAKEOFF AT AIRSPEED GREATER THAN 100 KNOTS, ADD 2 MILLION FOOT-POUNDS PER BRAKE IF BRAKES ARE APPLIED SOONER THAN 4 SECONDS AFTER THROTTLE IS RETARDED TO IDLE.
- IF LANDING WITH ASYMMETRICAL WING LOADING, TAKE ACTION AS APPLICABLE FOR NEXT HIGHER ENERGY ZONE TO ALLOW FOR UNEQUAL BRAKE ENERGY DISTRIBUTION



1F-16X-1-0244

Figure A2-15. (Sheet 1)

Brake Energy Limits — Max Effort Braking

ACTION TO BE TAKEN AS APPLICABLE TO THE AMOUNT OF BRAKE ENERGY ABSORBED

DANGER ZONE

1. REFER TO HOT BRAKES, SECTION III.
2. USE MODERATE BRAKING BELOW 25 KNOTS GROUNDSPEED AND MAINTAIN FORWARD MOTION.
3. HYDRAULIC FLUID OR TIRE FIRE IS IMMINENT. APPROACH MLG FROM FRONT OR REAR FOR FIRE FIGHTING PURPOSES ONLY. APPLY EXTINGUISHING AGENT AS FOG OR FOAM DIRECTLY ON THE WHEELS.

CAUTION ZONE

1. REFER TO HOT BRAKES, SECTION III.
2. THE AREA WITHIN 50 FEET OF EITHER MLG BRAKE SHOULD BE REGARDED AS UNSAFE FOR ONE HOUR AND 15 MINUTES FOLLOWING BRAKE USAGE UNLESS THE FUSIBLE PLUGS HAVE BLOWN TO RELIEVE TIRE PRESSURE
3. DO NOT ATTEMPT TAKEOFF UNTIL BRAKE HOUSINGS, WHEEL RIMS, AND TIRES HAVE COOLED ENOUGH TO PERMIT AT LEAST 15 SECONDS OF CONTINUOUS BARE HAND CONTACT. THIS COOLING PERIOD IS TO PREVENT POSSIBLE TIRE FAILURE DURING TAKEOFF OR IN FLIGHT.

RESTRICTED ZONE

ACTION TO BE TAKEN IS DETERMINED BY CUMULATIVE STOPPING ENERGY AND AMBIENT TEMPERATURE, AS INDICATED BY SAFE TIRE BEAD TEMPERATURE CHART.

1. IF CUMULATIVE STOPPING ENERGY PLUS TAXI ENERGY EXCEEDS THE LIMIT FOR SAFE TIRE BEAD TEMPERATURE:

   (A) DO NOT SET PARKING BRAKE.

   (B) DO NOT ATTEMPT TAKEOFF UNTIL BRAKE HOUSINGS, WHEEL RIMS, AND TIRES HAVE COOLED ENOUGH TO PERMIT AT LEAST 15 SECONDS OF CONTINUOUS BARE HAND CONTACT. THIS COOLING PERIOD IS TO PREVENT POSSIBLE TIRE FAILURE DURING TAKEOFF OR IN FLIGHT.

   (C) A COOLING PERIOD OF APPROXIMATELY 30 MINUTES PLUS AN ADDITIONAL 30 MINUTES FOR EACH ONE MILLION FOOT POUNDS BRAKE ENERGY ABOVE THE LIMIT FOR SAFE TIRE BEAD TEMPERATURE IS REQUIRED.

2. IF CUMULATIVE STOPPING ENERGY PLUS TAXI ENERGY DOES NOT EXCEED THE LIMIT FOR SAFE TIRE BEAD TEMPERATURE AND THE AIRCRAFT HAS NOT FLOWN IN THE PAST 2 HOURS, PARKING BRAKE MAY BE SET AND NO BRAKE COOLING IS REQUIRED PRIOR TO SUBSEQUENT TAKEOFF. DETERMINE MAXIMUM BRAKE APPLICATION SPEED IN CASE SUBSEQUENT TAKEOFF IS ABORTED BY SUBTRACTING CUMULATIVE STOPPING ENERGY AND TAXI ENERGY TOTAL FROM THE 18.2 MILLION FOOT-POUNDS.

Figure A2-15. (Sheet 2)

Safe Tire Bead Temperature

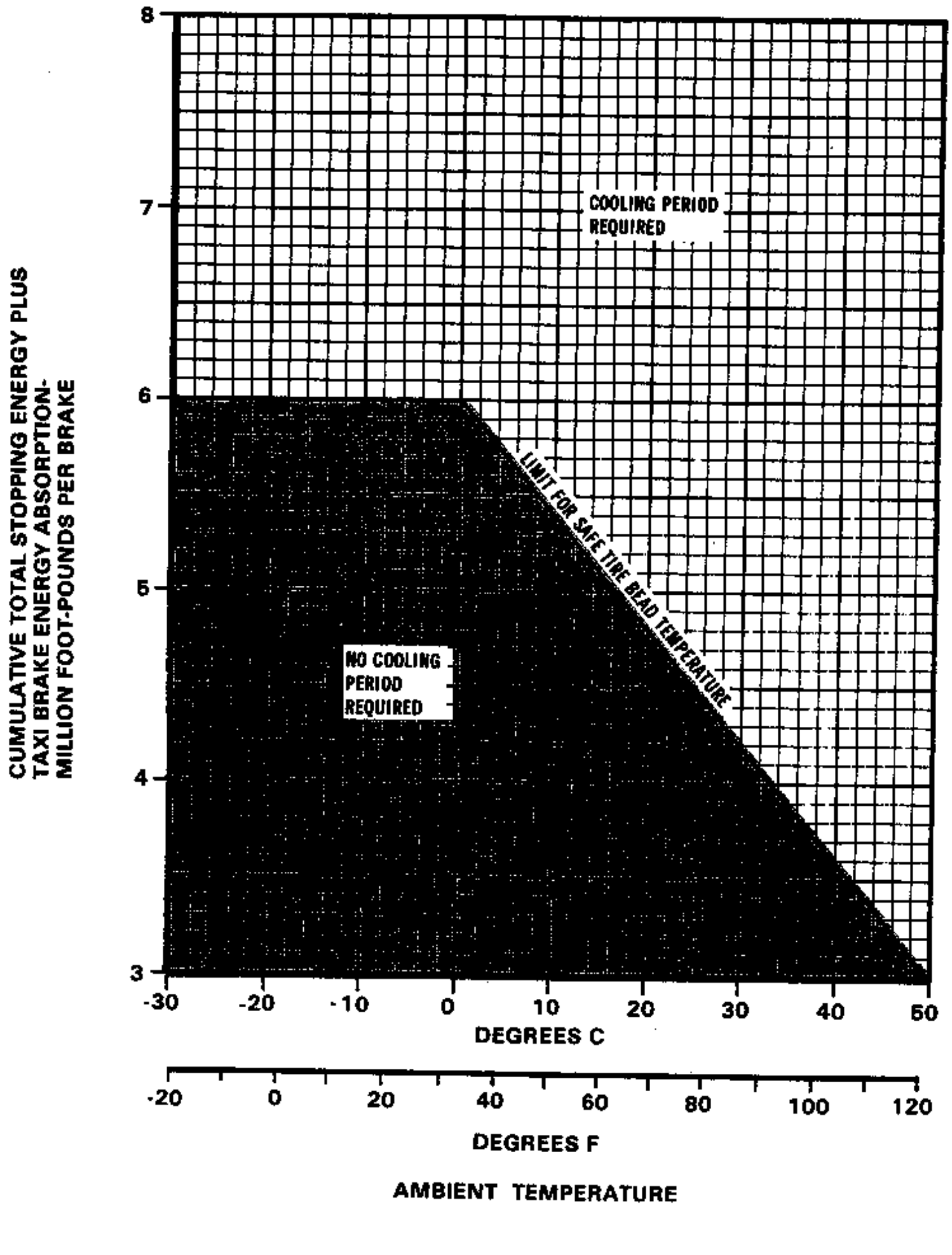


Figure A2-16.

PART 3 — CLIMB

TABLE OF CONTENTS

LIST OF CHARTS

Data needed to plan for MIL and MAX AB climbs is contained in this part, including climbout from takeoff, climb to cruise, and ceiling altitudes. Refer to Part 8 for information regarding combat ceiling and climb to combat ceiling.

GROUND OPERATIONS FUEL CONSUMPTION

Idle fuel flow is approximately 20 pounds per minute. An average of 25 pounds per minute is used for ground operation.

CLIMBOUT FUEL, TIME, AND DISTANCE

Figures A3-1 and A3-2 contain data describing takeoff fuel, time, and distance from brake release to climb speed. Effects of temperature, GW, altitude, and drag index are shown. A constant throttle position (MIL or MAX AB) from brake release to MIL or MAX AB climb speed is used. After lift-off, a constant pitch attitude of 12 degrees is held until 2500 feet AGL. A level acceleration to climb speed is then made. In some cases, climb airspeed will be reached prior to gaining 2500 feet AGL. This technique was developed for performance calculations only and not as an operational procedure.

REFER TO FIGURES A3-1 AND A3-2.

Enter chart with temperature (A); project horizontally to altitude (B), then down to intersect GW (C), and then horizontally to drag baseline; parallel nearest guideline to drag index; and, finally, project horizontally to read fuel consumed (E), time (F), and distance (G).

SAMPLE PROBLEM (MAX AB, FIGURE A3-2).

A.	Temperature	= 42°C
B.	Altitude	= 2000 feet
C.	GW	= 33,000 pounds
D.	Drag index	= 136
E.	Fuel consumed	= 1300 pounds
F.	Time	= 1.80 minutes
G.	Distance	= 8.9 NM

CRUISE CEILING AND OPTIMUM CRUISE ALTITUDE

Optimum cruise altitude, MIL cruise ceiling, and MIL service ceiling are shown in figure A3-3. All data is based on use of optimum cruise mach.

REFER TO FIGURE A3-3.

Enter upper portion of the chart with GW (A), project upward to drag index (B), and then project to the left to read optimum cruise altitude (C). Enter lower portion of chart with GW (A), project upward to drag index (B), and then project to the left to read MIL cruise ceiling (D).

SAMPLE PROBLEM.

A. GW	=	32,500 pounds
B. Drag index	=	136
C. Optimum cruise altitude	=	33,400 feet
D. MIL cruise ceiling (300 fpm)	=	35,200 feet
E. MIL service ceiling (100 fpm)	=	35,800 feet

MIL CLIMB

Figure A3-4 contains MIL climb data. Fuel consumed data is shown in sheet 1 and time and distance data is shown in sheet 2. The data is for climbs starting at sea level, but performance data for climbs from any altitude to a higher altitude may also be determined. Climb speed schedule is tabulated as a function of drag index. The climb airspeeds shown were selected to maintain maximum fuel efficiency while still providing near maximum rate of climb. To obtain data for climb to cruise ceiling, use the dashed drag cruise ceiling index lines.

REFER TO FIGURE A3-4.

Enter sheet 1 of chart at initial GW (A); proceed horizontally to final altitude (B), vertically to drag index (C), and horizontally to read fuel consumed (D). If initial altitude is above sea level, reenter chart at initial GW (A), proceed horizontally to initial altitude (E), and continue as above to read fuel used (F). The difference between fuel consumed to final altitude and fuel used to initial altitude is the fuel used to climb from initial to final altitude. Climb time and distance are found in a similar manner from sheet 2.

SAMPLE PROBLEM.

MIL climb to optimum cruise altitude.

A. Initial GW	=	32,500 pounds
B. Final altitude	=	33,400 feet (cruise altitude for 32,500 pounds, drag index = 136)
C. Drag index	=	136
D. Fuel consumed to final altitude	=	1220 pounds
E. Initial altitude	=	2500 feet
F. Fuel consumed to initial altitude	=	60 pounds
Fuel consumed to climb 1220–60	=	1160 pounds

Note that the cruise altitude used above is based on an initial climb GW of 32,500 pounds. This cruise altitude should be adjusted to account for the fuel consumed during climb and the climb fuel recomputed. Initial GW is unchanged.

A. Initial GW	=	32,500 pounds
G. Revised final altitude	=	34,400 feet based on end-of-climb weight (32,500–1160 = 31,340 from figure A3-3)
C. Drag index	=	136
H. Fuel consumed to final altitude	=	1300 pounds
E. Initial altitude	=	2500 feet
F. Fuel consumed to initial altitude	=	60 pounds

Fuel consumed in climb = 1300–60 = 1240 pounds
Distance in climb = 83–4 = 79 NM
Time in climb = 11.5–0.5 = 11.0 minutes
Climb speed (for drag index = 136) = 385 KIAS/0.83 mach

Climb fuel, time, and distance charts are based on a standard day. For nonstandard days, compute an average of the ambient temperature differentials at initial and final altitudes. Then adjust the values of time, distance, and fuel by the appropriate percentage noted on each chart.

- Temperature differential at final altitude = +5°C.
- Temperature differential at initial altitude = +15°C.
- Average temperature differential = +10°C.

For MIL, add 25 percent for each 10°C hotter than standard.

Final climb data is as follows:

Fuel consumed in climb = 1240+310 = 1550 pounds
Time in climb = 11.0+2.75 = 13.75 minutes
Distance in climb = 79+20 = 99 NM

MAX AB CLIMB

Figure A3-5, sheets 1 and 2, presents MAX AB climb data. The climb airspeed schedule given on sheet 1 will result in minimum time-to-climb to altitude at subsonic speeds. The climb airspeed schedule is in KTAS.

REFER TO FIGURE A3-5.

Refer to instructions under MIL CLIMB, above.

MIL Climbout Fuel, Time, Distance

DATA BASIS: FLIGHT TEST

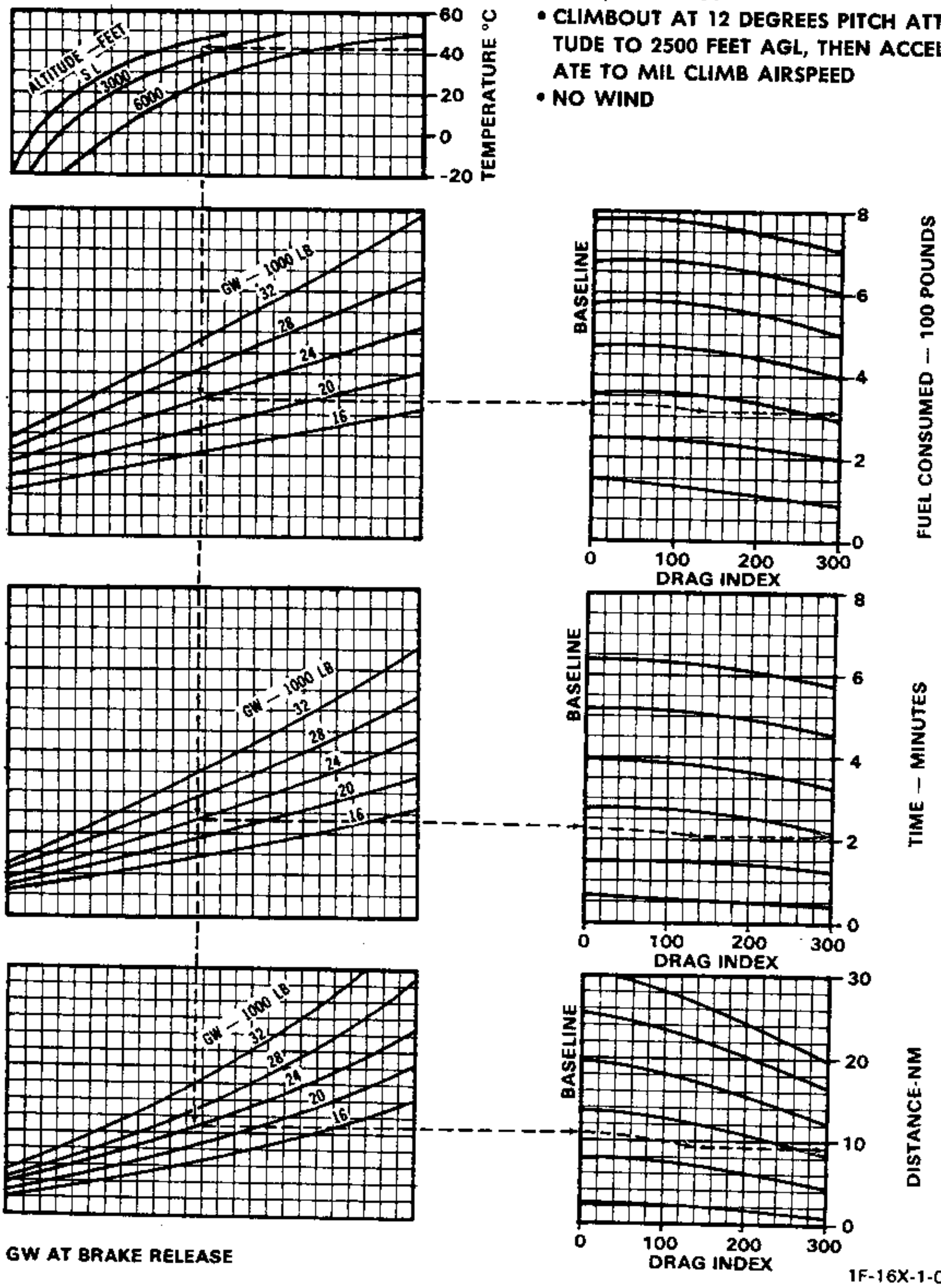
ENGINE: F100-PW-200

CONFIGURATION:

- LG/TEF'S RETRACTED AT 250 KIAS

CONDITIONS:

- DATA INCLUDES GROUND RUN FUEL, TIME, DISTANCE
- CLIMBOUT AT 12 DEGREES PITCH ATTITUDE TO 2500 FEET AGL, THEN ACCELERATE TO MIL CLIMB AIRSPEED
- NO WIND



NOTE: GW = GW AT BRAKE RELEASE

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Figure A3-1.

MAX AB Climbout Fuel, Time, Distance

DATA BASIS: ESTIMATED

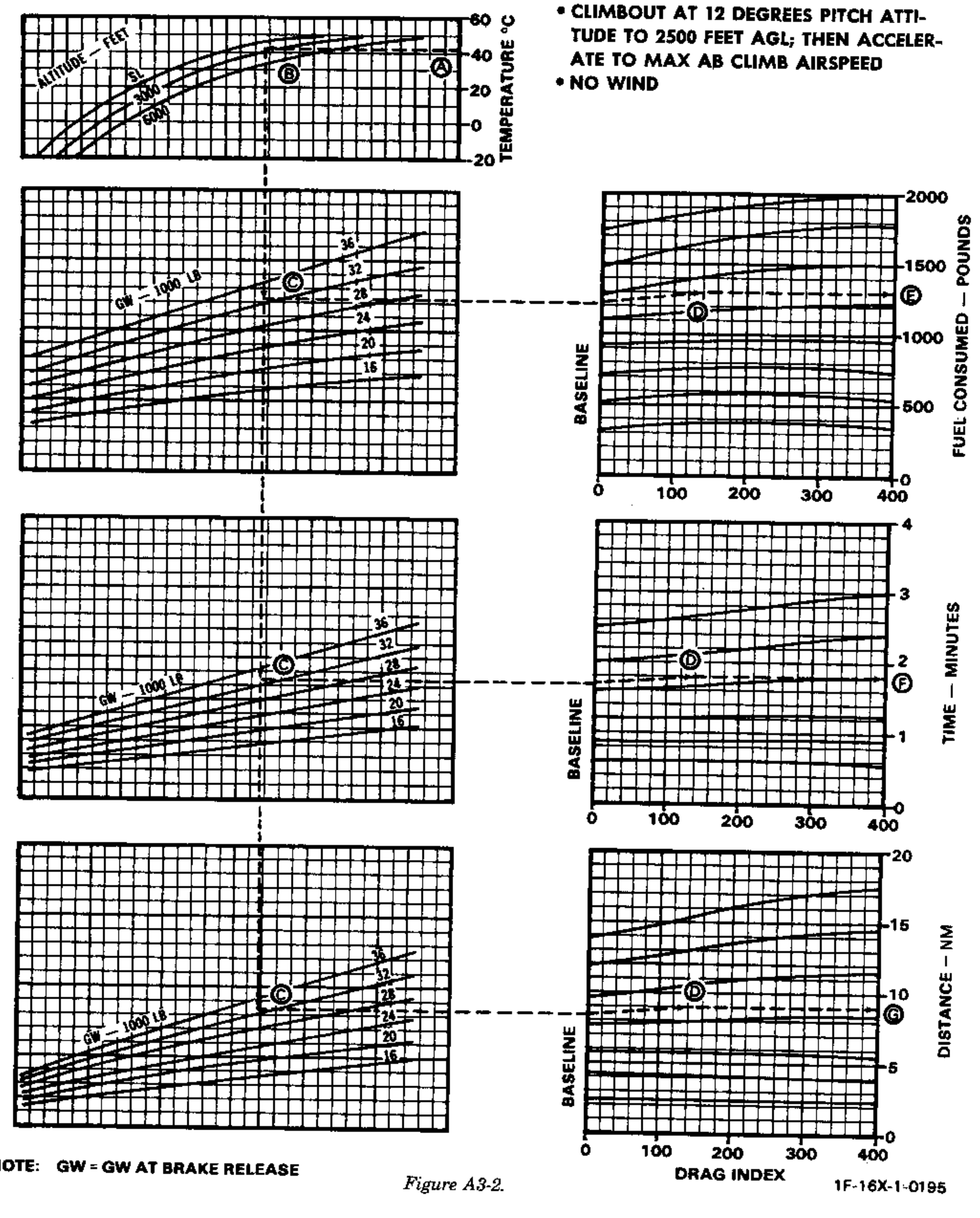
ENGINE: F100-PW-200

CONFIGURATION:

- LG/TEF'S RETRACTED AT 250 KIAS

CONDITIONS:

- DATA INCLUDES GROUND RUN FUEL, TIME, DISTANCE
- CLIMBOUT AT 12 DEGREES PITCH ATTITUDE TO 2500 FEET AGL; THEN ACCELERATE TO MAX AB CLIMB AIRSPEED
- NO WIND



NOTE: GW = GW AT BRAKE RELEASE

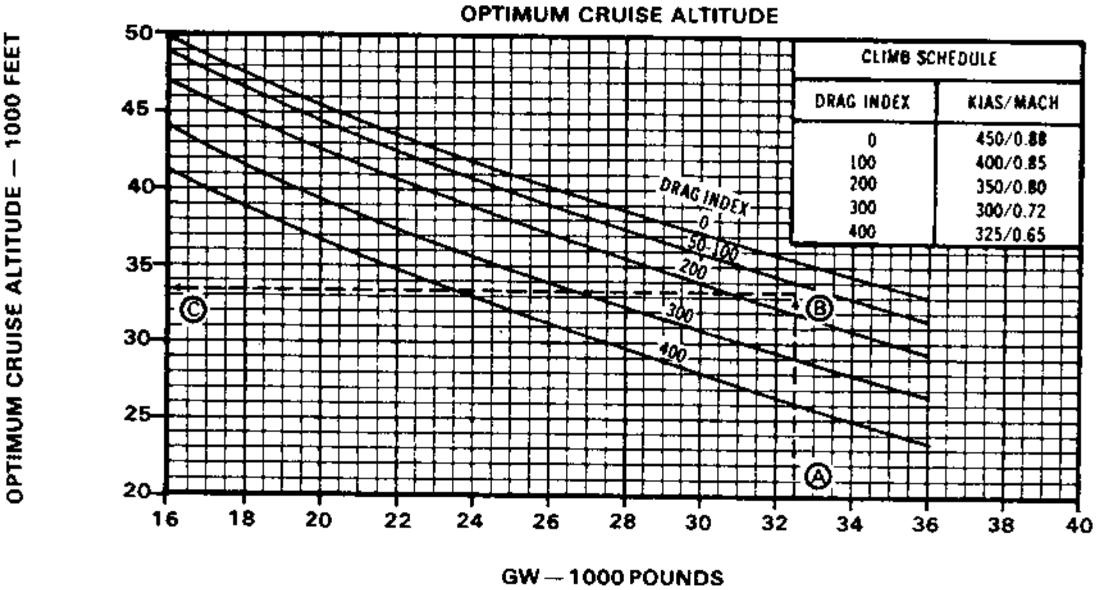
Figure A3-2.

1F-16X-1-0195

Cruise Ceilings and Optimum Cruise Altitude

DATA BASIS: FLIGHT TEST **ENGINE: F100-PW-200**

CONDITIONS:
- **STANDARD DAY**
- **OPTIMUM CRUISE MACH NUMBER**



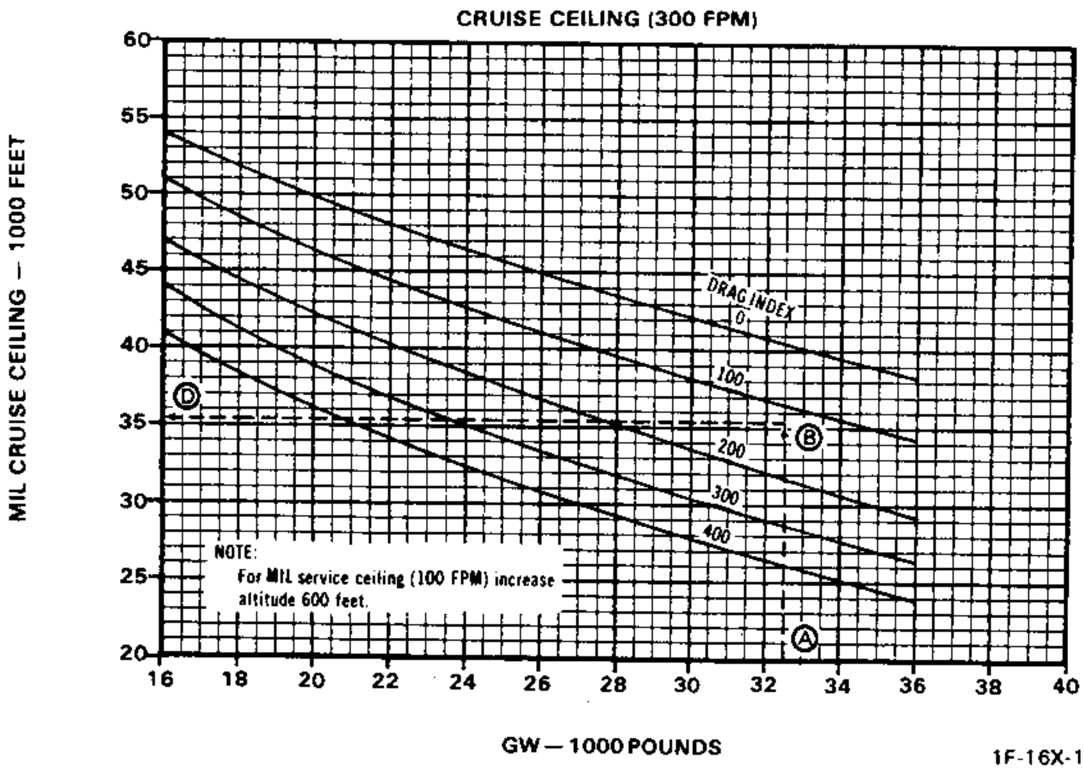


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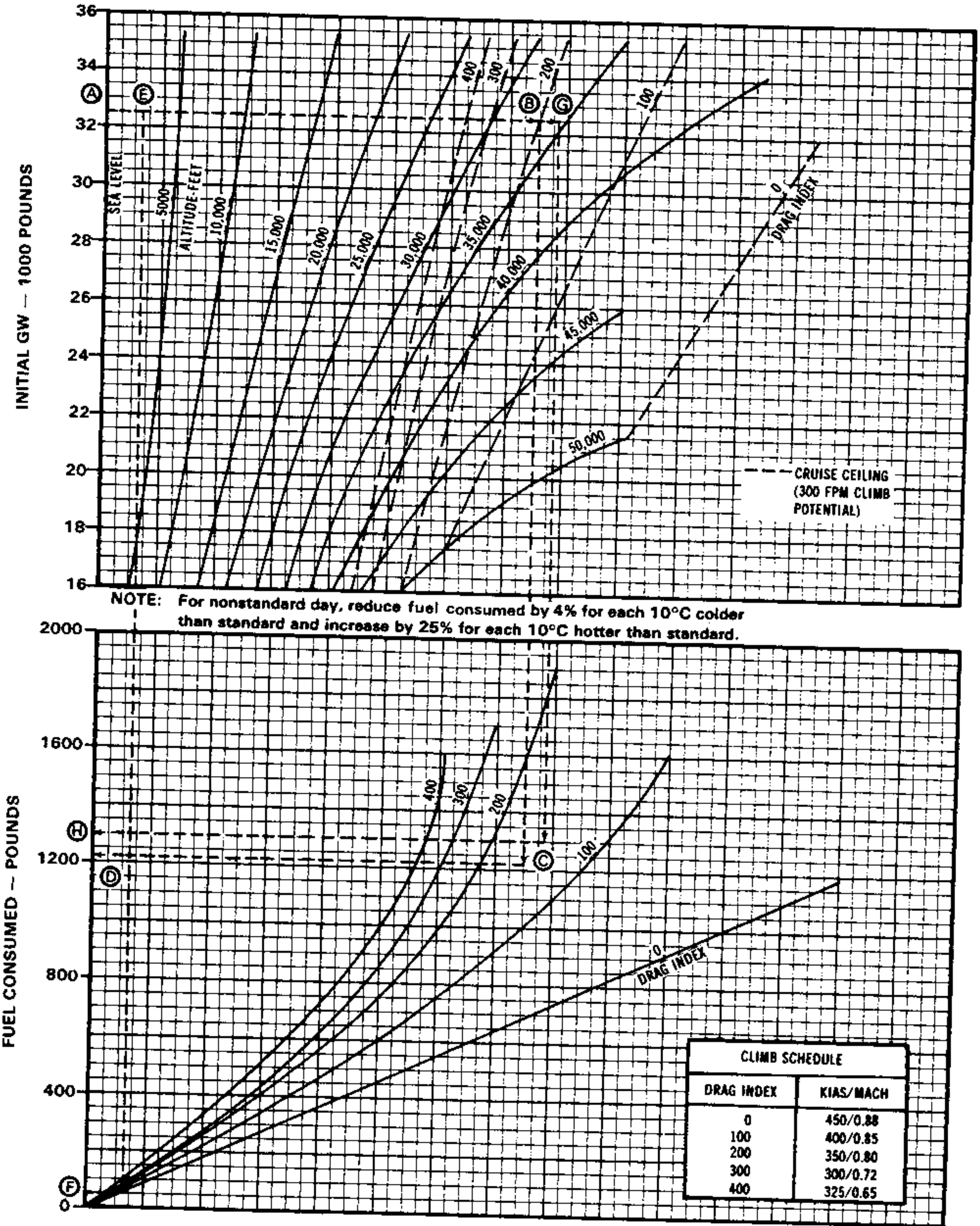
Figure A3-3.

MIL Climb — Fuel Consumed

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONDITIONS:
- STANDARD DAY



CLIMB SCHEDULE

DRAG INDEX	KIAS/MACH
0	450/0.88
100	400/0.85
200	350/0.80
300	300/0.72
400	325/0.65

Figure A3-4. (Sheet 1)

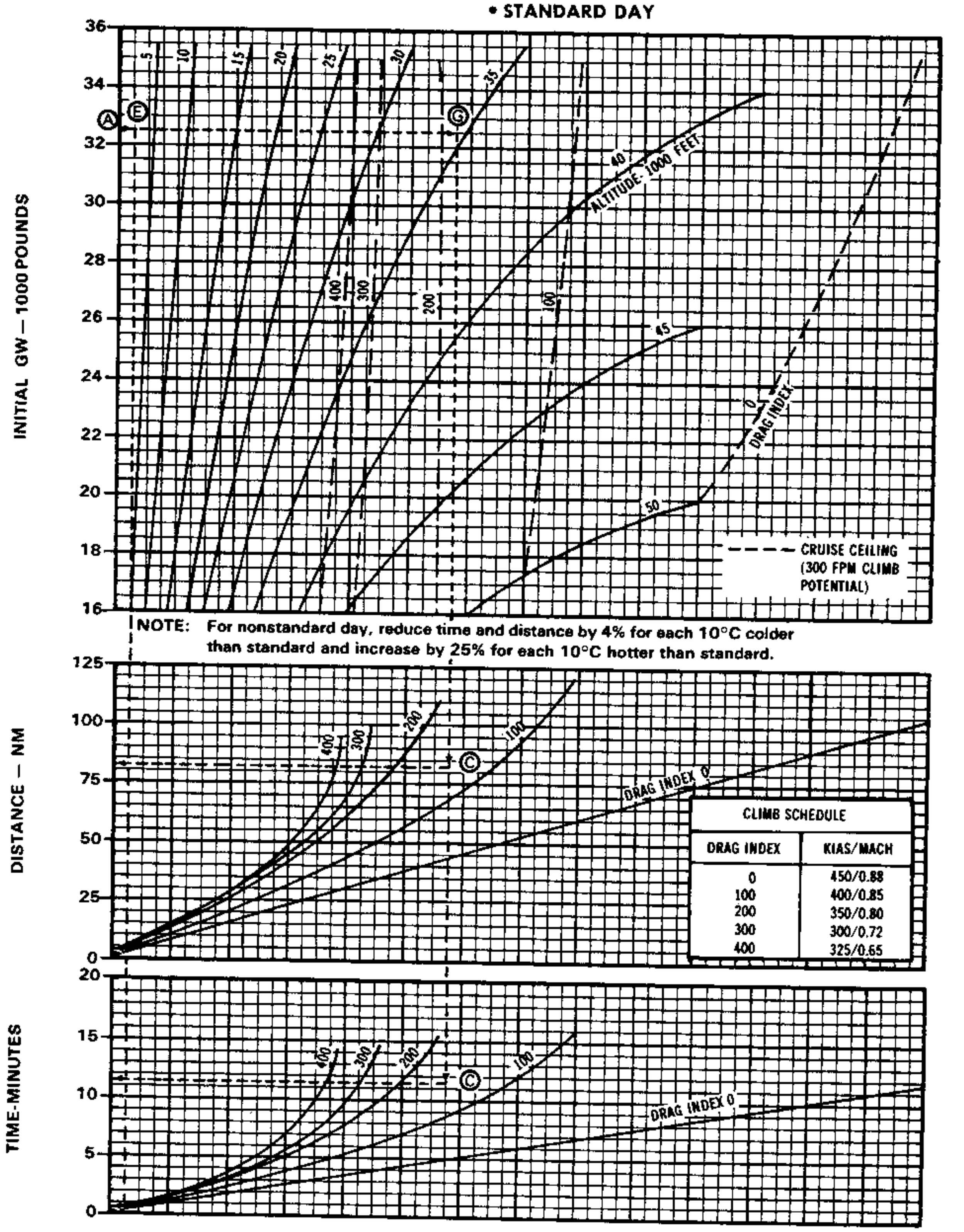
1F-16X-1-0516

MIL Climb — Distance and Time

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONDITIONS:
• STANDARD DAY



1F-16X-1-0517

Figure A3-4. (Sheet 2)

MAX AB Climb — Fuel Consumed

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONDITIONS:
• STANDARD DAY

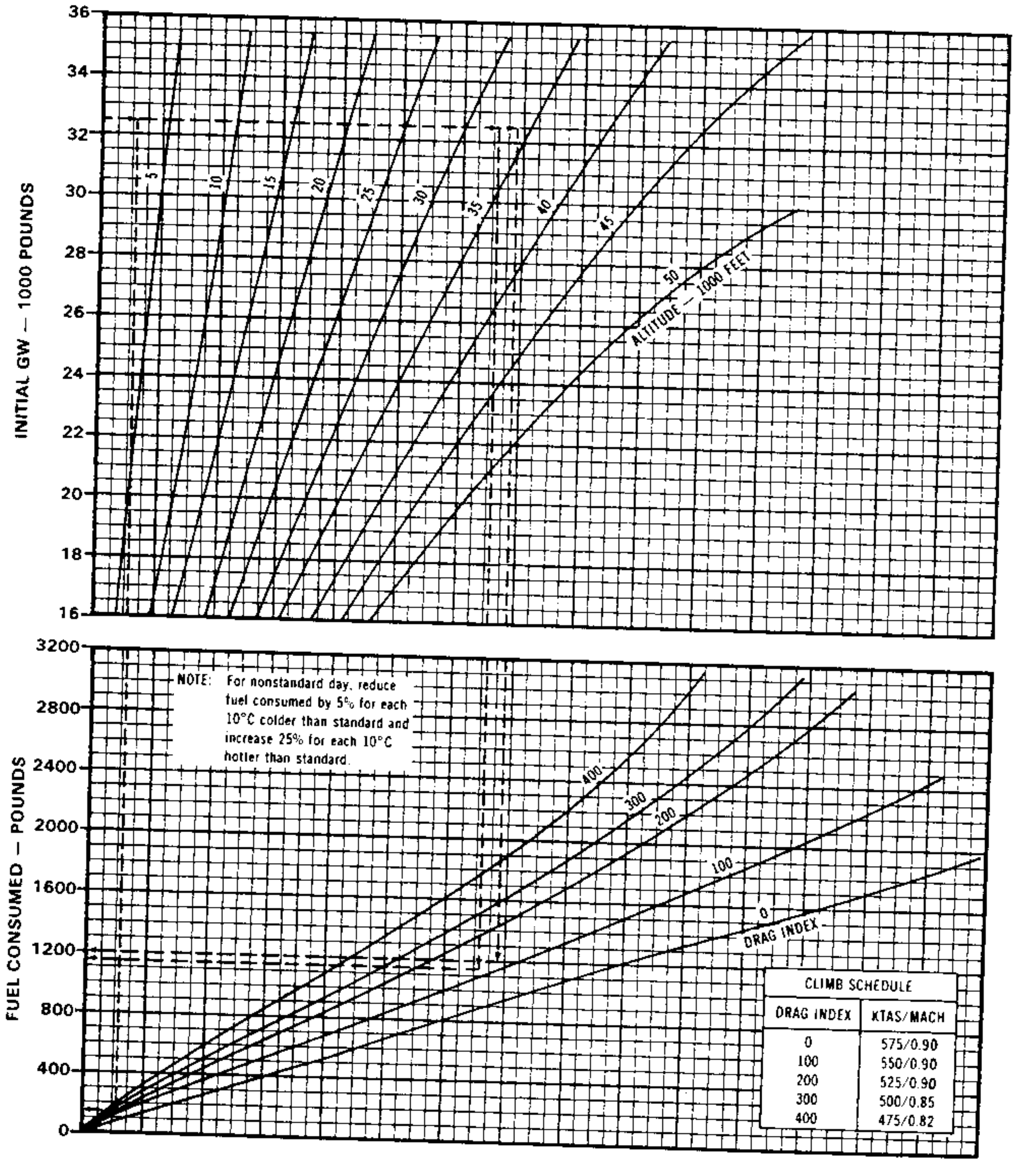


Figure A3-5. (Sheet 1)

MAX AB Climb — Distance and Time

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONDITIONS:
• STANDARD DAY

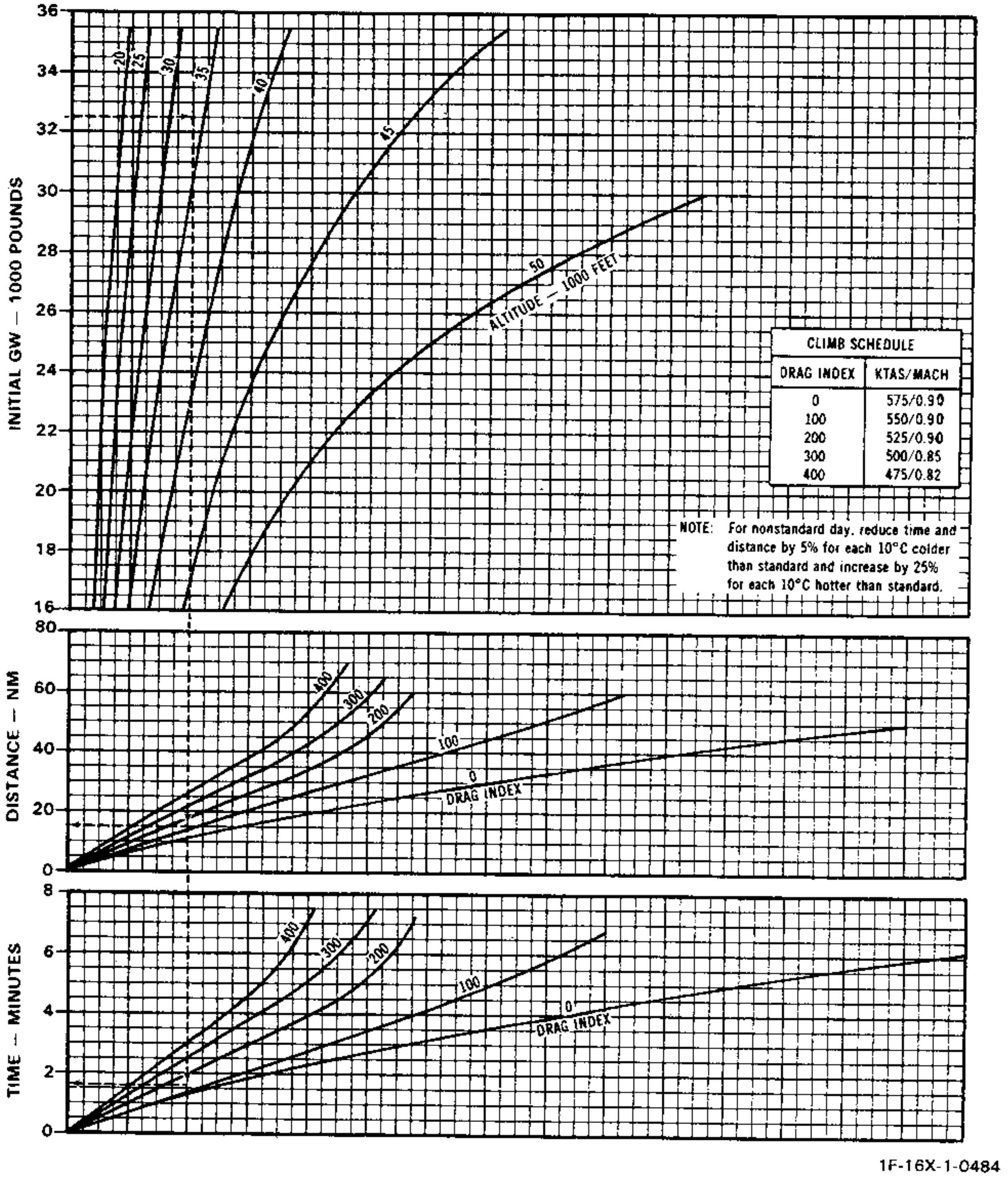


Figure A3-5. (Sheet 2)

PART 4 — CRUISE

TABLE OF CONTENTS

LIST OF CHARTS

CRUISE DATA

The cruise data shown is presented in two formats (the Subsonic Cruise charts and the Subsonic Cruise tables). This data enables the mission planner to calculate the optimum cruise performance available for any combination of flight conditions. The Subsonic Cruise charts show graphical presentation of cruise data in a very effective way of providing the visualization of trends and trade-offs to be considered when selecting mission parameters. For instance, a planner can easily visualize the effect of cruising at 0.9 mach rather than 0.8 mach at medium altitude. The Subsonic Cruise tables can then be used to extract fuel flow data. It is apparent from the Subsonic Cruise tables that the GW's for some of the drag indices are not realistic. This data is only used to give good results when extrapolation of the data is required. Three charts are supplied as aids in computing altitude factor, TAS, NM per pound of fuel, and fuel flow. The following considerations will

assist in selecting the combination of flight conditions and techniques which will result in required mission performance:

- Constant Mach/Constant Altitude: Cruise at a given mach and altitude condition. This technique does not usually provide maximum performance but is often used due to time and flight-path constraints.

- Constant Mach/Optimum Altitude: Any given mach number is held constant and altitude is increased as fuel is consumed. This technique will result in maximum range at a given mach number.

- Optimum Mach/Optimum Altitude: A cruise-climb technique is required. Mach remains constant throughout the cruise while altitude increases as fuel is consumed. Changes in optimum mach due to changes in GW are insignificant. Use of this technique will result in maximum attainable range (including maximum aircraft capability).

ALTITUDE FACTOR

Figure A4-1 provides a quick means of computing altitude factor for a known GW and altitude or converting altitude factor back into altitude. Any two parameters can be used to find the third.

REFER TO FIGURE A4-1.

To obtain altitude factor for a known GW and altitude, enter chart with GW (A); project vertically upward to altitude (B) and horizontally to the left to read altitude factor (C). To obtain altitude for a known GW and altitude factor, enter chart with GW (D) and project vertically upward. Enter with altitude factor (E) and project horizontally to the right until the GW line is intersected. Read altitude at the intersection of these two lines (F).

SAMPLE PROBLEM.

A.	GW	= 20,000 pounds
B.	Altitude	= 25,000 feet
C.	Altitude factor	= 5.4
D.	GW	= 20,000 pounds
E.	Altitude factor	= 12
F.	Altitude	= 42,200 feet

SUBSONIC CRUISE CHARTS

The Subsonic Cruise charts, figure A4-2, contain cruise data plotted as range factor versus mach number for lines of constant altitude factor. A correction grid is supplied on each chart for interpolating drag index. Each chart covers a range of drag indices. Use the chart which includes the required drag index to determine range factor. Three sets of usage instructions and sample problems are given below to illustrate the three different cruise techniques defined earlier in this section.

CONSTANT MACH/CONSTANT ALTITUDE CRUISE

REFER TO FIGURE A4-2.

Enter figure A4-1 with desired cruise altitude and initial GW and compute altitude factor. Enter appropriate Subsonic Cruise chart at desired cruise mach (A), project upward to altitude factor (B), project horizontally to the right to the drag index baseline, parallel nearest guideline to (C) drag index, and then project horizontally to read range factor (D). This entire process is repeated for a sufficient number of GW's to obtain required cruise range.

SAMPLE PROBLEM.

	Desired cruise altitude	= 25,000 feet
	Initial cruise GW	= 20,000 pounds
A.	Desired cruise mach	= 0.8
B.	Altitude factor	= 5.4 (from figure A4-1)
C.	Drag index	= 0
D.	Range factor	= 3.85

Note that as weight and altitude factor decrease, range factor also decreases. Specific range and fuel flow may be obtained as before for each GW.

CONSTANT MACH/OPTIMUM ALTITUDE CRUISE

REFER TO FIGURE A4-2.

Enter appropriate Subsonic Cruise chart at desired cruise mach number (A) and project vertically to the optimum (highest) altitude factor line (E). Note value of altitude factor. From (E), project to the right and correct for drag index (F); then continue to the right and read range factor (G). Altitude factor and range factor are constants for this type of cruise, allowing

cruise altitude, specific range, and fuel flow to be computed for several GW's using only the conversion charts.

SAMPLE PROBLEM.

A.	Desired cruise mach number	= 0.8
E.	Altitude factor	= 11
F.	Drag index	= 0
G.	Range factor	= 5.25

Altitude and specific range are found for any GW by using the conversion charts.

SPECIFIC RANGE CONVERSION

The Specific Range Conversion chart, figure A4-3, is used primarily to convert range factor into NM per pound of fuel (specific range).

REFER TO FIGURE A4-3.

To convert range factor into specific range, enter chart with range factor (A) and project vertically up to GW (B) and horizontally to the left to read specific range (C).

SAMPLE PROBLEM.

A.	Range factor	= 5.5
B.	GW	= 20,000 pounds
C.	Specific range	= 0.275 NM per pound of fuel

FUEL FLOW CONVERSION

The Fuel Flow Conversion chart, figure A4-4, is used to convert specific range and speed into fuel flow.

REFER TO FIGURE A4-4.

To convert specific range into fuel flow, enter chart with mach number (A); project to the right to temperature (standard day temperature is shown on figure A1-6) (B); then project upward, reading KTAS at (C); continue to specific range line (D); and finally project to the left to read fuel flow (E).

SAMPLE PROBLEM.

A.	Mach number	= 0.88
B.	Temperature	= −56.5°C (Standard day temperature is shown)
C.	KTAS	= 505
D.	Specific range	= 0.275 NM per pound of fuel
E.	Fuel flow	= 1800 pounds per hour

OPTIMUM MACH/OPTIMUM ALTITUDE CRUISE

Detailed optimum cruise-climb performance data is given in figure A4-5. Cruise data is shown as specific range and optimum altitude versus GW for lines of drag index. Optimum cruise mach numbers are tabulated on each drag index line. Fuel flow may be computed from figure A4-4.

REFER TO FIGURE A4-5.

Enter chart with cruise GW (A) and project vertically upward to drag index (B) in both the lower and upper portions of the chart. In the lower portion of the chart, project to the left from (B) to read specific range (C). In the upper portion of the chart, project to the left from (B) to read optimum cruise altitude (D). Optimum cruise mach number is obtained from the mach numbers indicated on the drag index lines in the lower portion of the chart.

SAMPLE PROBLEM.

A.	GW	= 20,000 pounds
B.	Drag index	= 0
C.	Specific range	= 0.268 NM per pound of fuel
D.	Optimum cruise altitude	= 45,300 feet
	Optimum cruise mach	= 0.88

SUBSONIC CRUISE TABLES

The Subsonic Cruise tables, figure A4-6, present dry thrust fuel flow data for a range of constant cruise altitudes (sea level – 45,000 feet), true airspeeds (210 – 600 knots), GW's (18,000 – 36,000 pounds), and drag indices (0 – 250). True airspeeds and fuel flows for maximum range/endurance cruise at constant altitude and drag index are presented for a range of GW's. If Vmin (minimum true airspeed based on MIL) is greater than 180 knots, then Vmin and the fuel flow at Vmin are shown. Temperature effect factors are presented for ±20°C ambient temperature deviation from standard. Cruise KTAS are presented in increments of 30 KTAS so they may be converted to NM per minute. The fuel flows are shown in PPH and pounds per minute; therefore, the

distance flown and fuel consumed at some specified cruise time in minutes may be quickly evaluated.

REFER TO FIGURE A4-6.

To find fuel flow for cruise at a constant true airspeed and altitude, enter the table with appropriate drag index, KTAS, and GW. Then read the fuel flow in PPH or pounds per minute. To find fuel flow and KTAS at constant altitude cruise for Vmin, maximum endurance, or maximum range, enter the table with drag index and GW. Then read standard fuel flow and KTAS for the specified condition. Temperature effect factors are found on the right side of each chart. Multiply standard day fuel flows by their respective factor to get final fuel flows for ±20°C deviation from standard. To compute fuel flows for other temperatures, simply ratio the difference between standard day values and ±20°C values for the particular temperature deviation.

True airspeeds for Vmin, maximum endurance, and maximum range are affected by ambient temperature and correction factors for these airspeeds are presented on the right side of the chart. These factors are used to correct KTAS in the same manner as described for fuel flows. If the factors are greater than 1, final fuel flow and KTAS will increase. If the factors are less than 1, final fuel flow and KTAS will decrease.

SAMPLE PROBLEM.

A. Altitude = 30,000 feet
B. Drag index = 0
C. GW = 20,000 pounds
D. KTAS = 360
E. Standard day ambient temperature = –44°C
F. Ambient temperature = –34°C
G. Temperature deviation = 10°C hot

Find fuel consumed and time required to cruise at 360 knots for 120 NM:

H. Standard day fuel flow = 1700 PPH/28.3 pounds per minute
I. Temperature effect fuel flow factor at +20°C and 360 KTAS = 1.07
J. Fuel flow at +20°C hot is 1.07×1700 or 1.07×28.3 = 1819 PPH 30.3 pounds per minute
K. Fuel flow for ambient temperature of –34°C is $1700+(119\times\frac{10}{20})$ = 1760 PPH or $28.3+(2\times\frac{10}{20})$ = 29.3 pounds per minute
L. Time to travel 120 NM at 360 KTAS is $120 \div \frac{360}{60}$ = 20 minutes
M. Fuel consumed in 20 minutes of cruise at 360 KTAS is 29.3×20 = 586 pounds

Find fuel consumed and air distance traveled for maximum range cruise for 30 minutes:

N. Standard day maximum range airspeed = 434 KTAS
O. Standard day fuel flow = 1890 PPH
P. Temperature effect factor for KTAS at +20°C = 1.04
Q. Temperature effect fuel flow factor at +20°C = 1.06
R. KTAS at 20°C hot is 1.04×434 = 451
S. Fuel flow at 20°C hot is 1.06×1890 = 2003 PPH
T. KTAS for ambient temperature of –34°C is $434+(17\times\frac{10}{20})$ = 443
U. Fuel flow for ambient temperature of – 34°C is $1890+(113\times\frac{10}{20})$ = 1947 PPH
V. Air distance traveled in 30 minutes at 443 KTAS is $\frac{443}{60}\times 30$ = 222 NM
W. Fuel consumed in 30 minutes of cruise at 443 KTAS is $\frac{1947}{60}\times 30$ = 974 pounds

To find the fuel flow and KTAS for maximum endurance cruise, use the method outlined above for maximum range cruise; then loiter time = fuel consumed/fuel flow.

REFER TO FIGURE A4-6, SHEET 1.

If an average bank angle of 30 degrees were used in the above problem, an effective GW of 23,000 pounds would have to be used to enter the chart. Find the effective GW by entering the lower right plot with GW (A), follow the guidelines to bank angle (B), and read effective GW (C).

SAMPLE PROBLEM.

A.	GW	= 20,000 pounds
B.	Bank angle	= 30 degrees
C.	Effective GW	= 23,000 pounds

DIVERSION DECISION

The Diversion Decision – Divert and Diversion Decision – Loiter, figure A4-7, contains range and time available data to be used in deciding whether to divert to another base or wait (loiter) until the runway is reopened. Data is given for fuel quantities up to 2000 pounds and for initial altitudes from sea level to 40,000 feet. Range and time available by staying at initial altitude or by climbing to optimum altitude are given. Range and time for climbs to optimum altitude, cruise or loiter, and descents to sea level are included in all data as applicable. No reserve fuel is included in the data.

SAMPLE PROBLEM.

Assume that you have arrived over base at 5000 feet MSL with only 600 pounds of fuel remaining and are informed that the runway has been closed due to an accident. Twenty to 30 minutes will be required to open the runway. Can you wait (loiter) for the runway to open, or should you divert to a base only 50 NM away? Checking figure A4-7 will yield the following information:

- Range Available at 5000 feet MSL = 75 NM (cruise at mach = 0.45, begin enroute descent 10 NM from destination with 40 pounds fuel used in descent).
- Range Available Using Optimum Altitude = 97 NM (climb at 426 KIAS/0.85 mach to 30,000 feet, cruise at mach 0.68, begin enroute descent 80 NM from destination with 270 pounds fuel used in descent).
- Loiter Time Available at 5000 feet MSL = 18.2 minutes (loiter at mach = 0.32, begin descent 10 NM from destination with 40 pounds fuel used in descent).
- Loiter Time Available Using Optimum Altitude = 20.0 minutes (climb at 426 KIAS/0.85 mach to 30,000 feet, loiter at mach = 0.53, begin descent 80 NM from destination with 270 pounds fuel used in descent).

Based on this information, a decision to divert to the nearby base would be prudent. Maximum holding time using all remaining fuel, optimum altitude, and an IDLE descent would yield only 20.0 minutes – too little. Even remaining at 5000 feet MSL, a range of 75 NM is available which would leave a small fuel reserve at the alternate base. Even more reserve fuel would remain if optimum altitude (30,000 feet) were used.

If range and time available (which require a fuel reserve) are needed, find the range and time which would be available if the desired reserve were consumed and deduct those values from range and time available for the total fuel on board. For instance, if 200 pounds reserve fuel had been required in the above problem, 28 NM would be deducted from the 75 NM range available by cruising at 5000 feet. The other range and times available would be adjusted in the same manner. However, note, for this sample problem, 50 NM is not obtainable with 200 pounds reserve.

BEST CRUISE ALTITUDE FOR SHORT RANGE MISSION

For short missions or mission legs, fuel consumption can be minimized by climbing to a lower-than-optimum cruise altitude and descending on course. For distances of 250 NM or less, use of a lower-than-optimum cruise altitude will result in lower overall fuel usage. Figure A4-8 contains information defining the best altitude to use for these short distances as a function of initial GW and distance. For distances greater than 250 NM, optimum cruise altitude should be used. Fuel consumption is given in figure A4-8 as a function of drag index for each initial GW and distance. Also provided in the chart is the range from destination at which to begin a penetration descent or maximum range descent. All data shown is based on beginning at sea level, climbing to the indicated altitude using MIL, cruising at optimum mach at the indicated altitude to the descent point, and executing a penetration descent (300 KIAS, 75 percent rpm, and speedbrakes open) or maximum range descent (at schedule KIAS, in idle, and with speedbrakes closed). MIL climb speed for any drag index may be obtained from Part 3 and optimum KTAS for constant altitude cruise from the

Subsonic Cruise Tables. Further guidance to establish the climb and cruise conditions recommended in the Best Altitude for Short Range Mission chart is available through the FCC cruise energy management guidance system. Climb speed for most economical climb may be established through use of the HOM mode cruise energy management option on the FCNP if a home steerpoint at least 50 NM distant is selected. Climb speed guidance is displayed on the HUD speed scale (scales switch set to EM-H/VV or VAH). Once at altitude, optimum cruise mach can be established by using the CAS, TAS, or GND speed guidance displayed on the HUD when the RNG mode is selected on the FCNP.

REFER TO FIGURE A4-8, SHEET 1.

Enter figure A4-8 with start climb GW (A), desired total mission range (B), and drag index (C). With these given conditions, read best cruise altitude (D), fuel consumed (E), and penetration descent range (F).

SAMPLE PROBLEM.

A.	Start climb GW	= 24,000 pounds
B.	Total mission range	= 150 NM
C.	Drag index	= 200
D.	Best cruise altitude	= 27,500 feet
E.	Fuel consumed	= 1520 pounds
F.	Penetration descent range	= 27 NM

REFER TO FIGURE A4-8, SHEET 2.

Sheet 2 is used in the same manner as sheet 1.

Altitude Factor

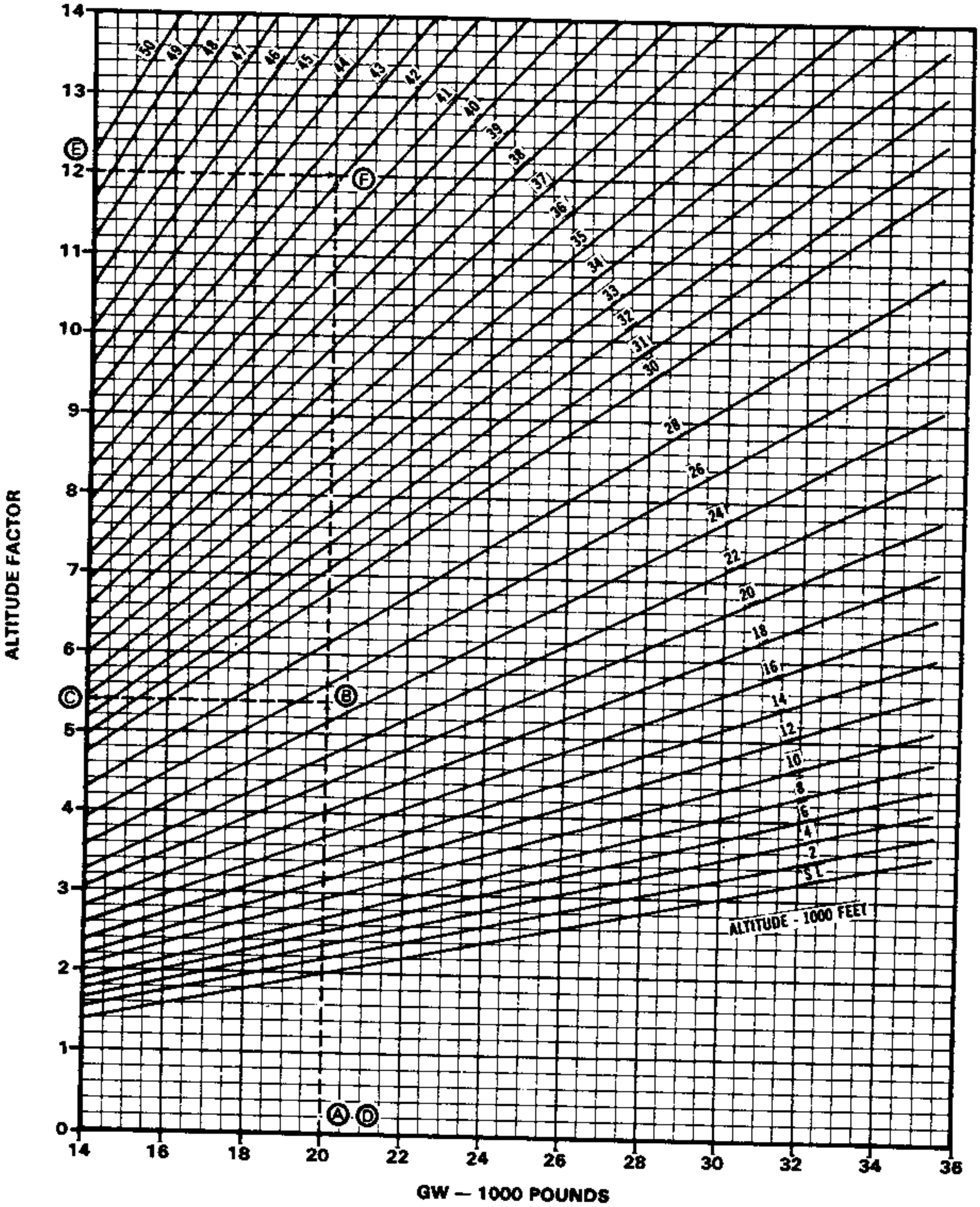


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Figure A4-1.

Subsonic Cruise — Drag Index = 0 to 49

DATA BASIS: FLIGHT TEST **ENGINE: F100-PW-200**

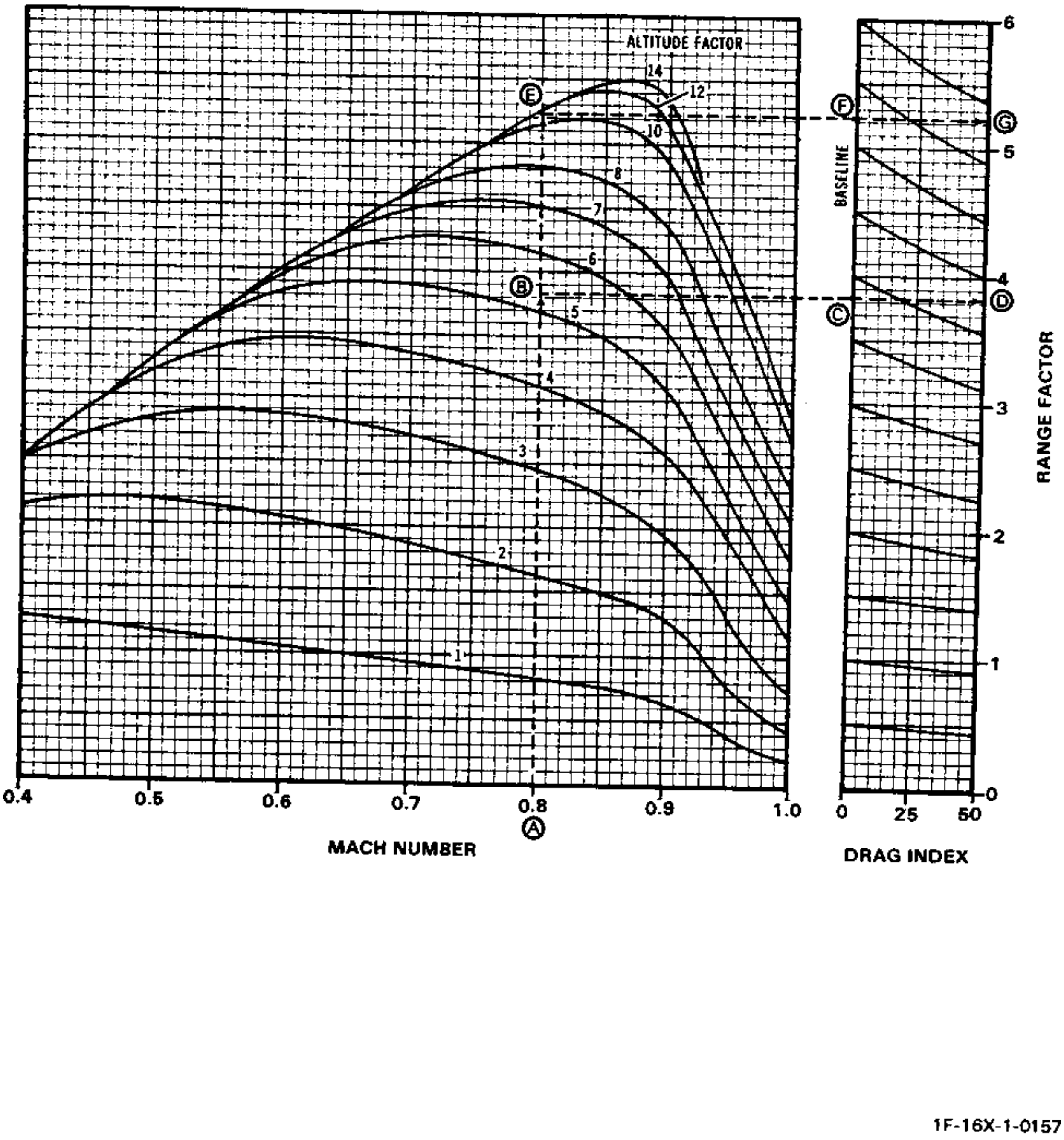

Figure A4-2. (Sheet 1)

Subsonic Cruise — Drag Index = 50 to 99

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

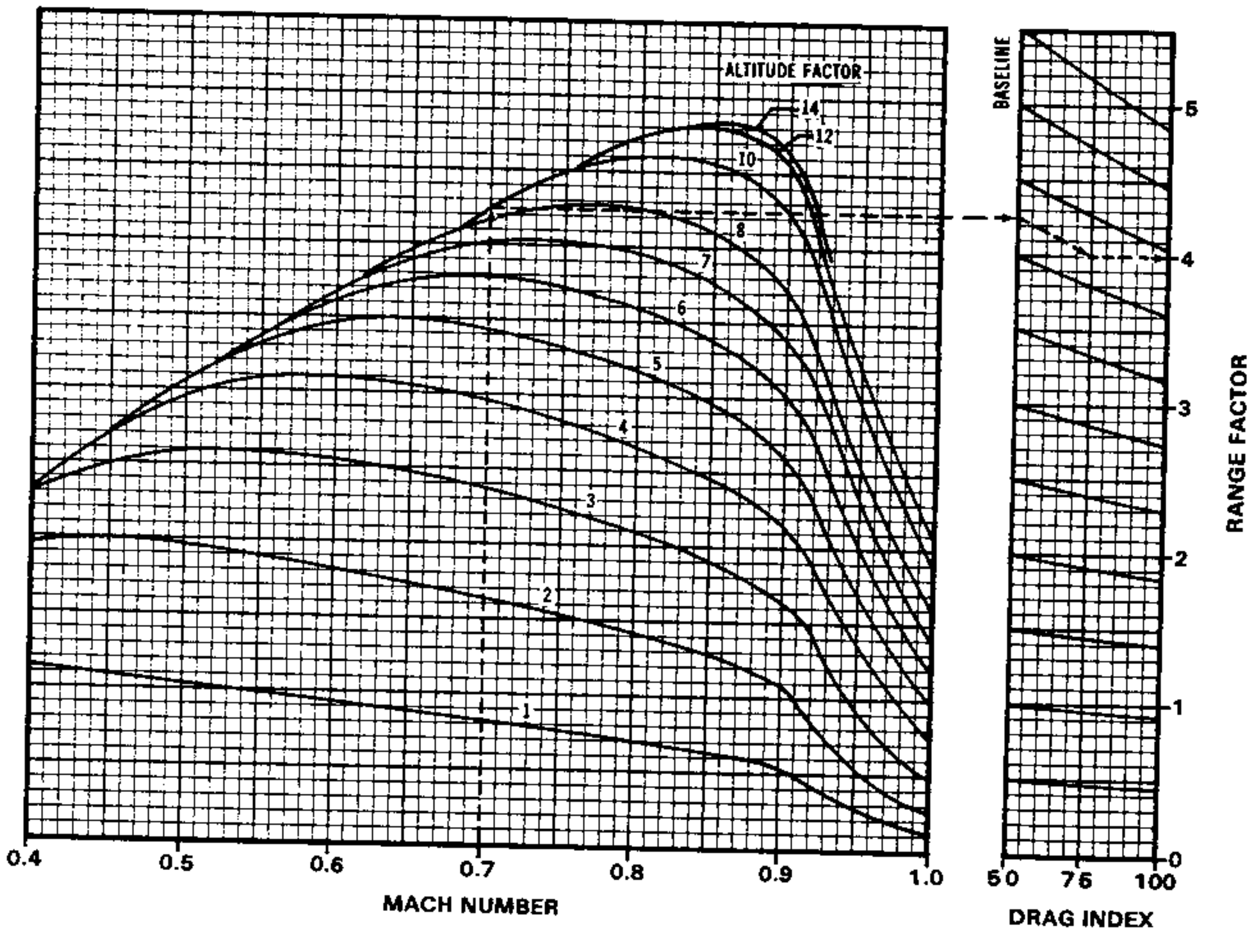

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Figure A4-2. (Sheet 2)

Subsonic Cruise — Drag Index = 100 to 199

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

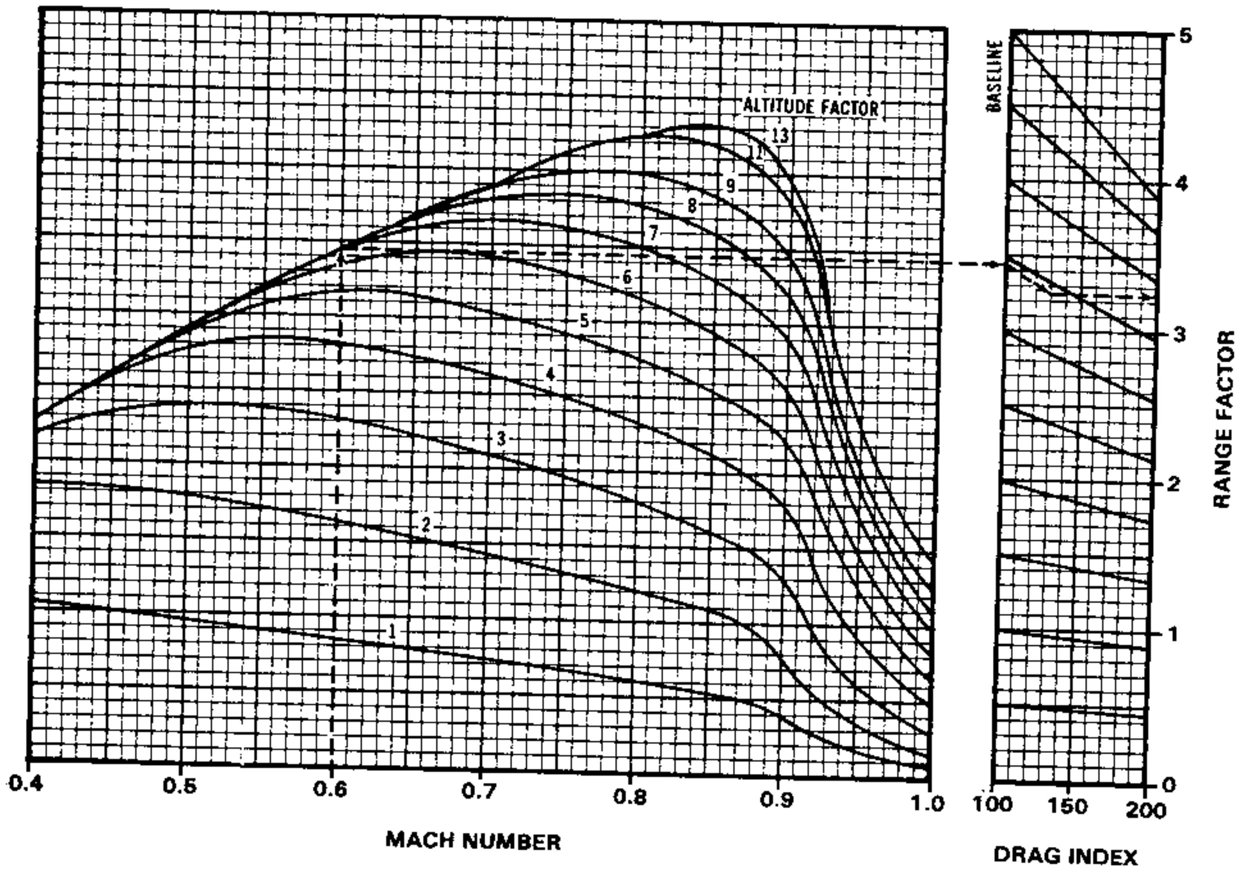

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Figure A4-2. (Sheet 3)

Subsonic Cruise — Drag Index = 200 to 299

DATA BASIS: FLIGHT TEST **ENGINE: F100-PW-200**

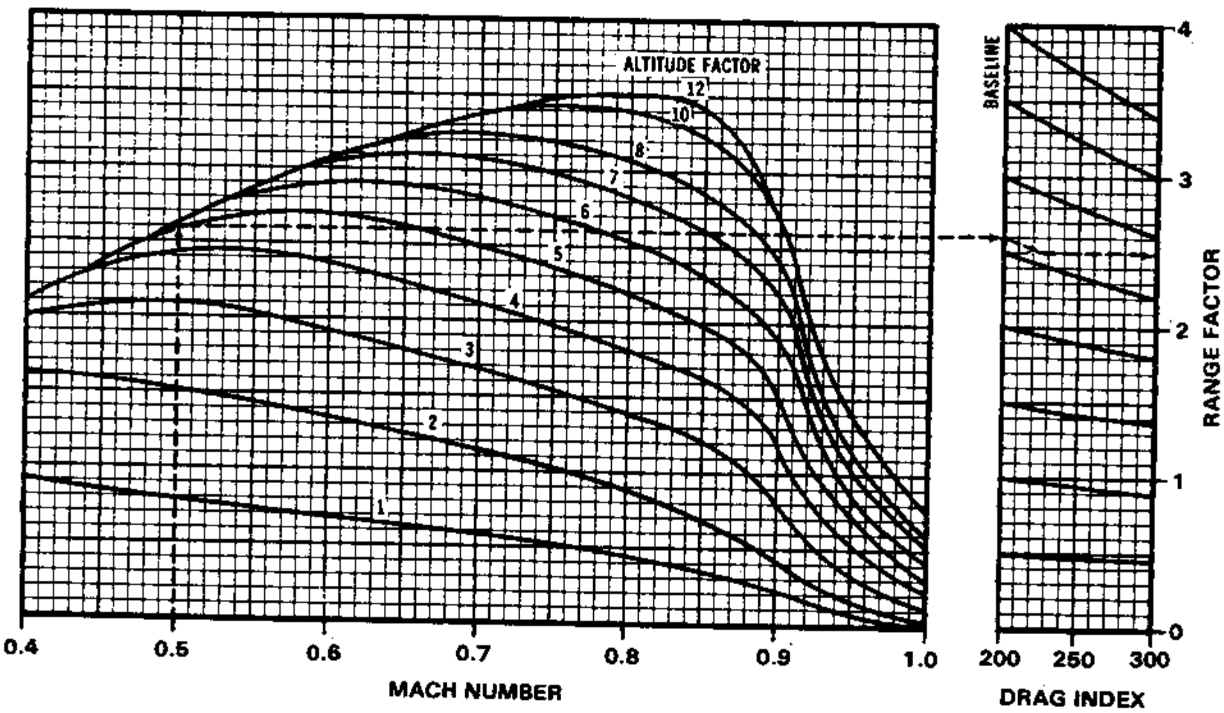

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Figure A4-2. (Sheet 4)

Specific Range Conversion

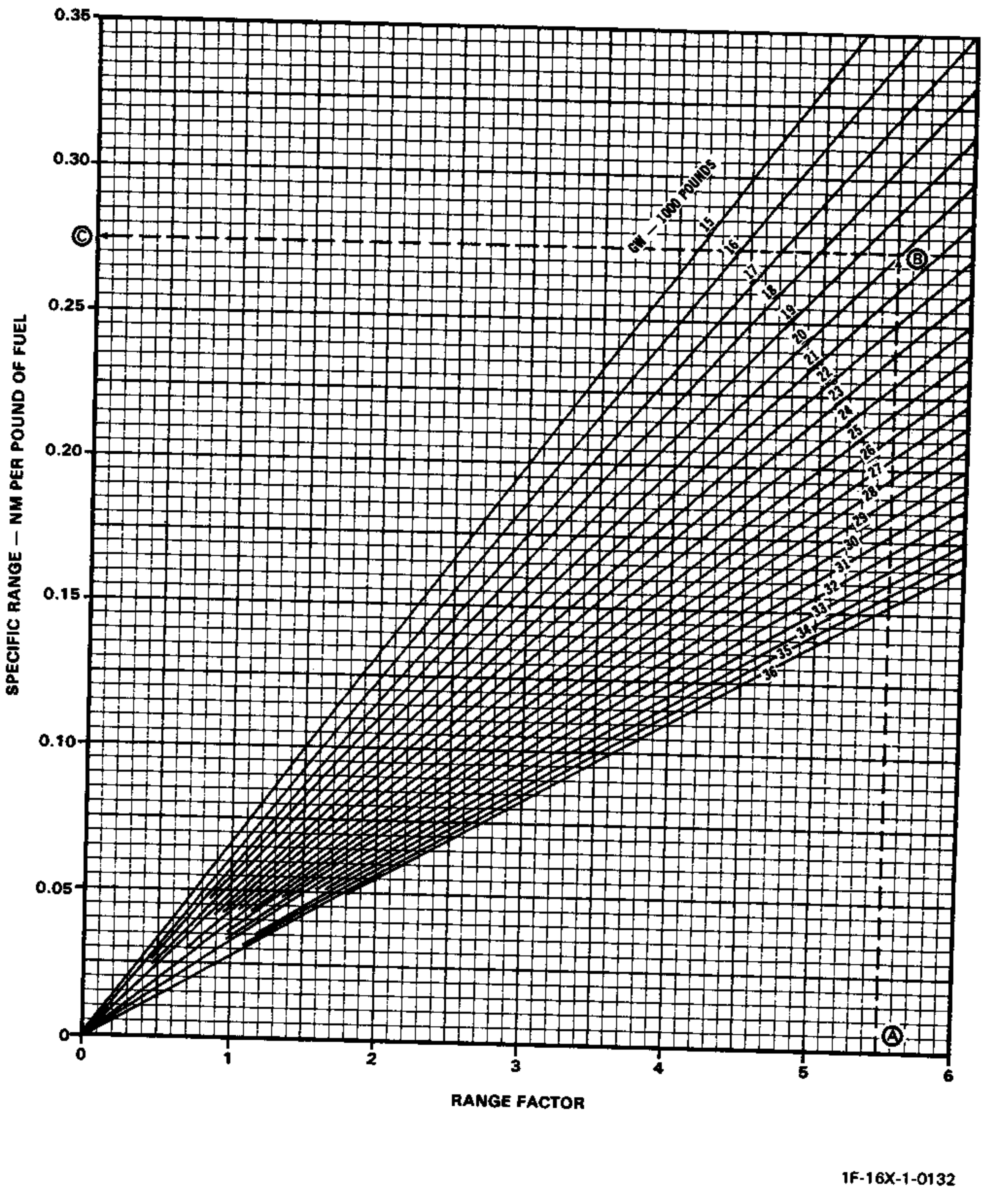


Figure A4-3.

Fuel Flow Conversion

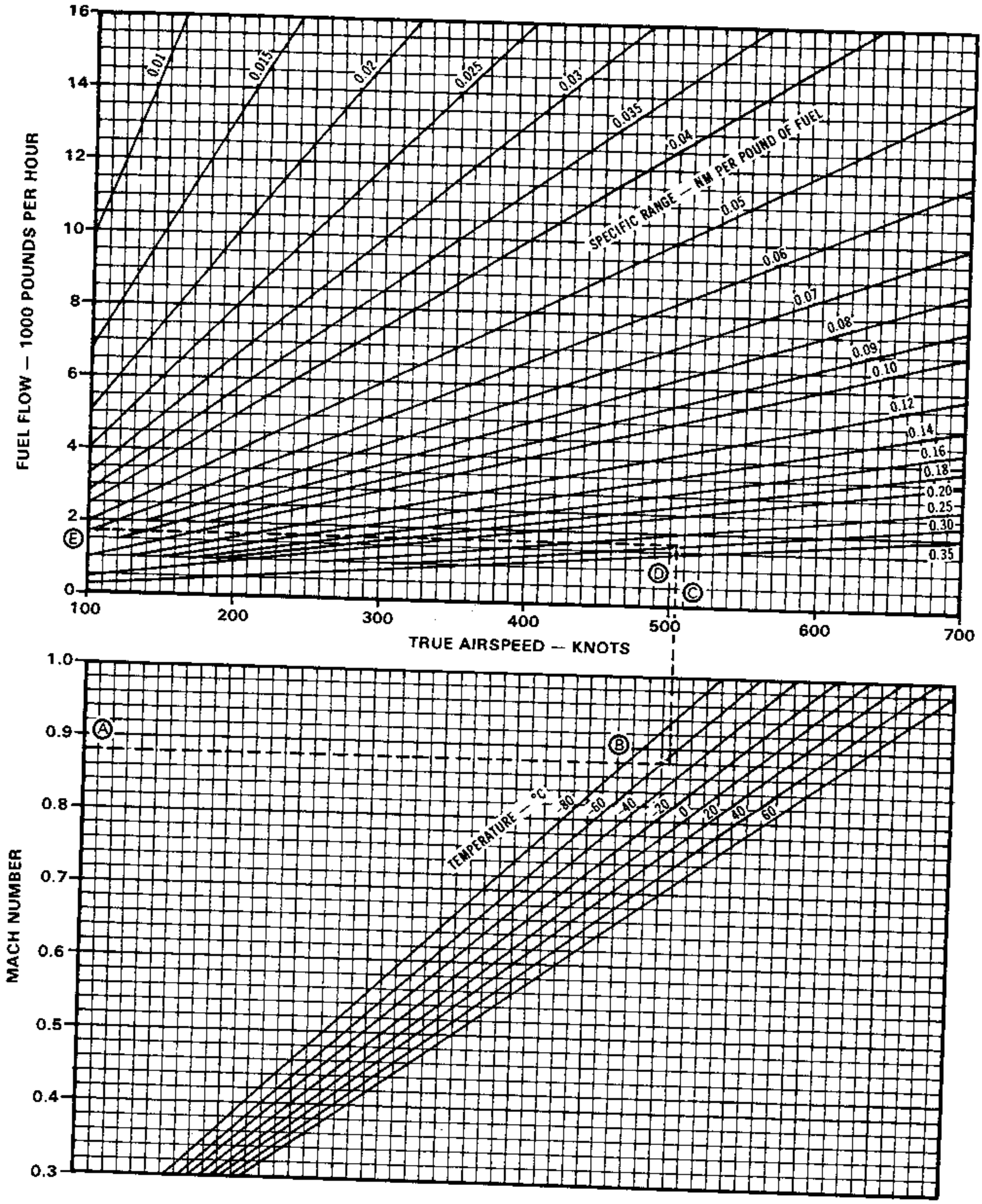


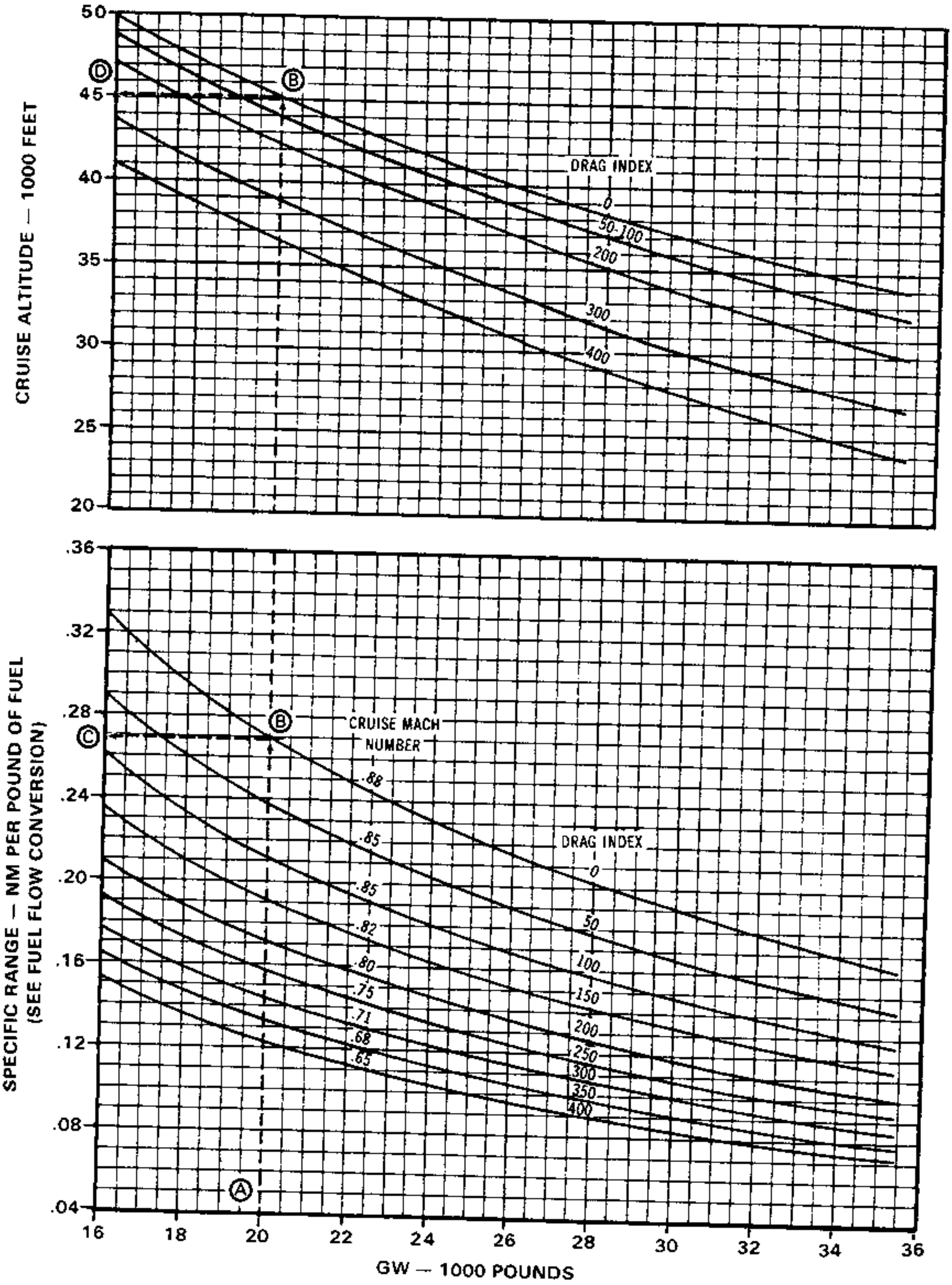
Figure A4-4.

Optimum Cruise

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

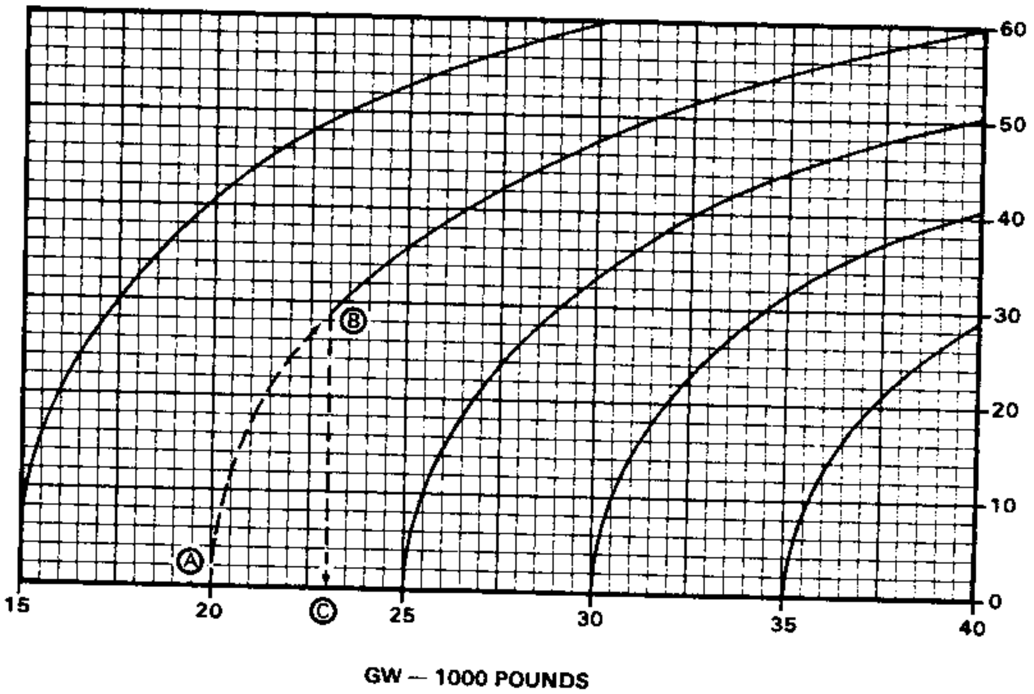
CONDITIONS:
- STANDARD DAY



1F-16X-1-0136

Figure A4-5.

Subsonic Cruise — Effects of Bank Angle



1F-16X-1-0630

Figure A4-6. (Sheet 1)

Subsonic Cruise — Sea Level

DATA BASIS: FLIGHT TEST **CONDITIONS:** **ENGINE:** F100-PW-200

• STANDARD DAY TEMPERATURE (15°C)

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 0

KTAS	TOTAL FUEL FLOW — GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	-20°C
MIL														
VMIN	—		—		—		—		—		—			
210	2050	34.2	2210	36.8	2580	43.0	3060	51.0	3610	60.2	4260	71.0	1.07	0.94
240	2160	36.0	2270	37.8	2530	42.2	2860	47.7	3280	54.7	3760	62.7	1.04	0.96
270	2350	39.2	2430	40.5	2640	44.0	2890	48.2	3200	53.3	3550	59.2	1.03	0.97
300	2620	43.7	2680	44.7	2850	47.5	3060	51.0	3300	55.0	3570	59.5	1.02	0.98
330	2940	49.0	2990	49.8	3120	52.0	3290	54.8	3480	58.0	3710	61.8	1.01	0.99
360	3330	55.5	3380	56.3	3480	58.0	3600	60.0	3760	62.7	3950	65.8	1.00	0.99
390	3730	62.2	3760	62.7	3840	64.0	3940	65.7	4070	67.8	4220	70.3	1.00	1.00
420	4180	69.7	4210	70.2	4280	71.3	4360	72.7	4460	74.3	4570	76.2	1.00	1.00
450	4700	78.3	4710	78.5	4760	79.3	4840	80.7	4920	82.0	5010	83.5	0.99	1.01
480	5280	88.0	5290	88.2	5330	88.8	5380	89.7	5450	90.8	5540	92.3	0.98	1.02
510	5940	99.0	5950	99.2	5980	99.7	6020	100.3	6080	101.3	6140	102.3	0.98	1.02
540	6720	112.0	6730	112.2	6750	112.5	6790	113.2	6830	113.8	6890	114.8	0.97	1.04
570	7740	129.0	7750	129.2	7770	129.5	7810	130.2	7850	130.8	7900	131.7	0.96	1.07
600	9440	157.3	9460	157.7	9510	158.5	9570	159.5	9630	160.5	9700	161.7	0.91	1.33
MAX ENDURANCE														
KTAS	199		210		233		252		265		282		1.03	0.96
FUEL FLOW	2040		2210		2530		2850		3190		3540		1.05	0.95
MAX RANGE														
KTAS	281		299		326		336		383		397		1.03	0.96
FUEL FLOW	2440		2670		3080		3340		3990		4280		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY

—VMIN LESS THAN 180 KTAS

DRAG INDEX = 50

KTAS	18,000 LB/HR	LB/MIN	20,000 LB/HR	LB/MIN	24,000 LB/HR	LB/MIN	28,000 LB/HR	LB/MIN	32,000 LB/HR	LB/MIN	36,000 LB/HR	LB/MIN	+20°C	-20°C
MIL														
VMIN	—		—		—		—		—		—			
210	2160	36.0	2310	38.5	2690	44.8	3170	52.8	3720	62.0	4380	73.0	1.06	0.83
240	2310	38.5	2420	40.3	2680	44.7	3020	50.3	3440	57.3	3900	65.0	1.04	0.88
270	2540	42.3	2630	43.8	2840	47.3	3090	51.5	3400	56.7	3750	62.5	1.02	0.91
300	2870	47.8	2940	49.0	3110	51.8	3320	55.3	3550	59.2	3830	63.8	1.02	0.94
330	3270	54.5	3320	55.3	3450	57.5	3610	60.2	3810	63.5	4030	67.2	1.01	0.97
360	3730	62.2	3780	63.0	3880	64.7	4000	66.7	4160	69.3	4330	72.2	1.00	0.98
390	4200	70.0	4240	70.7	4320	72.0	4410	73.5	4530	75.5	4670	77.8	1.00	0.99
420	4750	79.2	4770	79.5	4830	80.5	4910	81.8	5000	83.3	5110	85.2	0.99	1.00
450	5360	89.3	5370	89.5	5420	90.3	5490	91.5	5580	93.0	5660	94.3	0.99	1.01
480	6070	101.2	6080	101.3	6110	101.8	6160	102.7	6240	104.0	6320	105.3	0.98	1.02
510	6900	115.0	6900	115.0	6930	115.5	6970	116.2	7020	117.0	7090	118.2	0.97	1.03
540	7910	131.8	7920	132.0	7940	132.3	7970	132.8	8020	133.7	8080	134.7	0.96	1.05
570	9280	154.7	9290	154.8	9310	155.2	9340	155.7	9380	156.3	9440	157.3	0.87	1.09
600	11,760	196.0	11,770	196.2	11,810	196.8	11,860	197.7	11,920	198.7	11,970	199.5	0.82	1.23
MAX ENDURANCE														
KTAS	194		202		223		244		257		270		1.03	0.96
FUEL FLOW	2130		2310		2660		3020		3380		3750		1.05	0.95
MAX RANGE														
KTAS	265		276		301		330		343		389		1.03	0.96
FUEL FLOW	2490		2680		3120		3610		3950		4660		1.05	0.95

Figure A4-6. (Sheet 2)

Subsonic Cruise — Sea Level

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (15°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 100

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
MIL														
VMIN	—		—		—		—		—		—			
210	2270	37.8	2420	40.3	2800	46.7	3280	54.7	3830	63.8	4490	74.8	1.07	0.94
240	2450	40.8	2560	42.7	2830	47.2	3170	52.8	3590	59.8	4040	67.3	1.05	0.96
270	2740	45.7	2830	47.2	3040	50.7	3290	54.8	3600	60.0	3950	65.8	1.03	0.98
300	3140	52.3	3210	53.5	3380	56.3	3580	59.7	3810	63.5	4070	67.8	1.02	0.99
330	3600	60.0	3650	60.8	3780	63.0	3940	65.7	4120	68.7	4330	72.2	1.01	0.99
360	4140	69.0	4180	69.7	4270	71.2	4390	73.2	4530	75.5	4710	78.5	1.00	1.00
390	4670	77.8	4700	78.3	4770	79.5	4870	81.2	4990	83.2	5130	85.5	1.00	1.00
420	5300	88.3	5330	88.8	5390	89.8	5470	91.2	5560	92.7	5670	94.5	0.99	1.01
450	6030	100.5	6040	100.7	6090	101.5	6170	102.8	6250	104.2	6350	105.8	0.99	1.02
480	6920	115.3	6920	115.3	6950	115.8	7010	116.8	7090	118.2	7190	119.8	0.98	1.03
510	8000	133.3	8000	133.3	8000	133.7	8060	134.3	8120	135.3	8190	136.5	0.97	1.04
540	9290	154.8	9270	154.8	9290	154.8	9320	155.3	9360	156.0	9410	156.8	0.96	1.05
570	10,970	182.8	10,970	182.8	10,980	183.0	11,000	183.3	11,030	183.8	11,080	184.7	0.94	1.11
MAX ENDURANCE														
KTAS	189		199		218		236		252		266		1.03	0.96
FUEL FLOW	2220		2410		2790		3170		3560		3940		1.05	0.95
MAX RANGE														
KTAS	263		265		288		316		331		349		1.03	0.96
FUEL FLOW	2660		2770		3230		3770		4130		4560		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY

—VMIN LESS THAN 180 KTAS

DRAG INDEX = 150

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
MIL														
VMIN	—		—		—		—		—		—			
210	2380	39.7	2530	42.2	2920	48.7	3400	56.7	3940	65.7	4600	76.7	1.06	0.88
240	2600	43.3	2720	45.3	2990	49.8	3330	55.5	3740	62.3	4180	69.7	1.04	0.96
270	2950	49.2	3040	50.7	3250	54.2	3500	58.3	3810	63.5	4140	69.0	1.02	0.98
300	3410	26.8	3480	58.0	3640	60.7	3840	64.0	4060	67.7	4310	71.8	1.01	0.99
330	3940	65.7	3990	66.5	4110	68.5	4250	70.8	4430	73.8	4630	77.2	1.01	1.00
360	4530	75.5	4560	76.0	4650	77.5	4770	79.5	4910	81.8	5090	84.8	1.00	1.00
390	5140	85.7	5170	86.2	5240	87.3	5340	89.0	5450	90.8	5600	93.3	1.00	1.01
420	5880	98.0	5900	98.3	5970	99.5	6050	100.8	6150	102.5	6270	104.5	0.99	1.02
450	6780	113.0	6790	113.2	6850	114.2	6930	115.5	7030	117.2	7130	118.8	0.98	1.03
480	7880	131.3	7890	131.5	7910	131.8	7970	132.8	8050	134.2	8150	135.8	0.97	1.04
510	9170	152.8	9170	152.8	9180	153.0	9210	153.5	9270	154.5	9340	155.7	0.97	1.04
540	10,690	178.2	10,680	178.0	10,680	178.0	10,690	178.2	10,720	178.7	10,770	179.5	0.96	1.06
MAX ENDURANCE														
KTAS	186		198		217		233		249		259		1.03	0.96
FUEL FLOW	2310		2500		2910		3320		3720		4120		1.05	0.95
MAX RANGE														
KTAS	251		256		274		299		329		335		1.03	0.96
FUEL FLOW	2710		2870		3290		3830		4420		4710		1.05	0.95

Figure A4-6. (Sheet 3)

Subsonic Cruise — Sea Level

DATA BASIS: FLIGHT TEST

CONDITIONS:

ENGINE: F100-PW-200

• STANDARD DAY TEMPERATURE (15°C)

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 200

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
	TOTAL FUEL FLOW													
MIL														
VMIN	—		—		—		—		—		—			
210	2490	41.5	2640	44.0	3030	50.5	3510	58.5	4050	67.5	4720	78.7	1.08	0.93
240	2760	46.0	2870	47.8	3140	52.3	3480	58.0	3880	64.7	4320	72.0	1.05	0.95
270	3160	52.7	3250	54.2	3460	57.7	3710	61.8	3990	66.5	4320	72.0	1.03	0.97
300	3680	61.3	3750	62.5	3910	65.2	4090	68.2	4310	71.8	4560	76.0	1.02	0.98
330	4260	71.0	4310	71.8	4420	73.7	4560	76.0	4740	79.0	4940	82.3	1.01	1.00
360	4910	81.8	4950	82.5	5040	84.0	5160	86.0	5300	88.3	5480	91.3	1.00	1.00
390	5620	93.7	5650	94.2	5720	95.3	5820	97.0	5950	99.2	6110	101.8	0.99	1.01
420	6520	108.7	6540	109.0	6610	110.2	6700	111.7	6810	113.5	6930	115.5	0.98	1.02
450	7600	126.7	7600	126.7	7660	127.7	7740	129.0	7830	130.5	7930	132.2	0.98	1.03
480	8870	147.8	8870	147.8	8890	148.2	8950	149.2	9020	150.3	9120	152.0	0.97	1.04
510	10,350	172.5	10,340	172.3	10,340	172.3	10,370	172.8	10,420	173.7	10,490	174.8	0.96	1.05
	MAX ENDURANCE													
KTAS	184		194		211		228		243		254			
FUEL FLOW	2390		2590		3030		3460		3880		4280		1.03	0.96
													1.05	0.95
	MAX RANGE													
KTAS	243		251		265		293		316		331			
FUEL FLOW	2790		2990		3390		3990		4530		4950		1.03	0.96
													1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY

—VMIN LESS THAN 180 KTAS

DRAG INDEX = 250

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
MIL														
VMIN	—		—		—		—		—		—			
210	2600	43.3	2760	46.0	3140	52.3	3620	60.3	4160	69.3	4850	80.8	1.07	0.94
240	2920	48.7	3030	50.5	3300	55.0	3640	60.7	4020	67.0	4460	74.3	1.05	0.96
270	3370	56.2	3460	57.7	3670	61.2	3900	65.0	4180	69.7	4510	75.2	1.03	0.98
300	3950	65.8	4010	66.8	4160	69.3	4340	72.3	4550	75.8	4800	80.0	1.02	0.99
330	4580	76.3	4630	77.2	4740	79.0	4880	81.3	5050	84.2	5250	87.5	1.01	1.00
360	5310	88.5	5350	89.2	5440	90.7	5560	92.7	5710	95.2	5900	98.3	1.00	1.01
390	6140	102.3	6180	103.0	6260	104.3	6370	106.2	6500	108.3	6660	111.0	0.99	1.02
420	7200	120.0	7220	120.3	7290	121.5	7380	123.0	7480	124.7	7600	126.7	0.98	1.03
450	8420	140.3	8420	140.3	8480	141.3	8550	142.5	8640	144.0	8740	145.7	0.97	1.03
480	9850	164.2	9840	164.0	9860	164.3	9910	165.2	9990	166.5	10,080	168.0	0.96	1.04
510	11,610	193.5	11,600	193.3	11,590	193.2	11,610	193.5					0.96	1.05
	MAX ENDURANCE													
KTAS	179		189		206		222		236		251			
FUEL FLOW	2470		2690		3140		3590		4020		4440		1.03	0.96
													1.05	0.95
	MAX RANGE													
KTAS	235		248		261		284		303		322			
FUEL FLOW	2860		3130		3540		4090		4600		5110		1.03	0.96
													1.05	0.95

Figure A4-6. (Sheet 4)

Subsonic Cruise — 4000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (7°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 0

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
	TOTAL FUEL FLOW													
MIL														
VMIN	—		—		—		—		—		—			
210	1950	32.5	2130	35.5	2580	43.0	3100	51.7	3740	62.3	4600	76.7	1.07	0.93
240	2000	33.3	2130	35.5	2440	40.7	2830	47.2	3300	55.0	3770	62.8	1.05	0.95
270	2140	35.7	2240	37.3	2480	41.3	2770	46.2	3120	52.0	3510	58.5	1.03	0.97
300	2360	39.3	2440	40.7	2630	43.8	2860	47.7	3130	52.2	3440	57.3	1.02	0.98
330	2630	43.8	2690	44.8	2840	47.3	3030	50.5	3250	54.2	3500	58.3	1.02	0.99
360	2970	49.5	3020	50.3	3130	52.2	3290	54.8	3470	57.8	3670	61.2	1.01	0.99
390	3310	55.2	3350	55.8	3440	57.3	3560	59.3	3710	61.8	3870	64.5	1.01	1.00
420	3700	61.7	3730	62.2	3810	63.5	3900	65.0	4010	66.8	4150	69.2	1.00	1.00
450	4120	68.7	4150	69.2	4220	70.3	4300	71.7	4380	73.0	4480	74.7	1.00	1.01
480	4640	77.3	4660	77.7	4710	78.5	4770	79.5	4850	80.8	4940	82.3	0.99	1.02
510	5230	87.2	5240	87.3	5280	88.0	5330	88.8	5390	89.8	5470	91.2	0.98	1.03
540	5940	99.0	5950	99.2	5990	99.8	6030	100.5	6080	101.3	6150	102.5	0.96	1.05
570	6910	115.2	6930	115.5	6970	116.2	7020	117.0	7080	118.0	7140	119.0	0.94	1.11
600	8970	149.5	9000	150.0	9060	151.0	9150	152.5	9240	154.0	9300	155.0	0.85	1.40
	MAX ENDURANCE													
KTAS	211		224		248		263		282		300		1.04	0.96
FUEL FLOW	1950		2110		2430		2770		3110		3440		1.05	0.95
	MAX RANGE													
KTAS	300		316		326		374		392		419		1.04	0.96
FUEL FLOW	2350		2560		2810		3410		3730		4140		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY
—VMIN LESS THAN 180 KTAS

DRAG INDEX = 50

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
MIL														
VMIN	—		—		—		—		—		—			
210	2050	34.2	2220	37.0	2680	44.7	3200	53.3	3840	64.0	4730	78.8	1.07	0.93
240	2130	35.5	2260	37.7	2570	42.8	2970	49.5	3420	57.0	3900	65.0	1.05	0.95
270	2310	38.5	2420	40.3	2650	44.2	2950	49.2	3290	54.8	3680	61.3	1.03	0.97
300	2590	43.2	2670	44.5	2860	47.7	3090	51.5	3350	55.8	3650	60.8	1.02	0.98
330	2920	48.7	2970	49.5	3130	52.2	3310	55.2	3530	58.8	3760	62.7	1.01	0.99
360	3320	55.3	3370	56.2	3480	58.0	3630	60.5	3800	63.3	4000	66.7	1.00	1.00
390	3730	62.2	3760	62.7	3850	64.2	3970	66.2	4110	68.5	4270	71.2	1.00	1.01
420	4190	69.8	4220	70.3	4300	71.7	4390	73.2	4490	74.8	4630	77.2	1.00	1.01
450	4700	78.3	4730	78.8	4790	79.8	4880	81.3	4960	82.7	5060	84.3	0.99	1.02
480	5340	89.0	5350	89.2	5400	90.0	5470	91.2	5550	92.5	5640	94.0	0.98	1.03
510	6070	101.2	6090	101.5	6120	102.0	6180	103.0	6250	104.2	6330	105.5	0.97	1.04
540	7030	117.2	7040	117.3	7070	117.8	7110	118.5	7170	119.5	7240	120.7	0.95	1.06
570	8340	139.0	8350	139.2	8390	139.8	8440	140.7	8500	141.7	8560	142.7	0.93	1.14
600	11,300	188.3	11,320	118.7	11,370	189.5	11,430	190.5	11,510	191.8	11,560	192.7	0.83	1.32
	MAX ENDURANCE													
KTAS	203		216		240		257		272		288		1.04	0.96
FUEL FLOW	2050		2220		2570		2930		3290		3640		1.05	0.95
	MAX RANGE													
KTAS	279		291		325		335		383		392		1.04	0.96
FUEL FLOW	2390		2590		3080		3360		4030		4290		1.05	0.95

Figure A4-6. (Sheet 5)

Subsonic Cruise — 4000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (7°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 100

KTAS	GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	-20°C
MIL														
VMIN	—		—		—		—		—		—			
210	2140	35.7	2320	38.7	2770	46.2	3290	54.8	3950	65.8	4850	80.8	1.09	0.93
240	2260	37.7	2390	39.8	2710	45.2	3100	51.7	3540	59.0	4030	67.2	1.06	0.95
270	2490	41.5	2600	43.3	2830	47.2	3120	52.0	3460	57.7	3840	64.0	1.04	0.97
300	2820	47.0	2900	48.3	3090	51.5	3310	55.2	3570	59.5	3860	64.3	1.02	0.98
330	3210	53.5	3270	54.5	3420	57.0	3600	60.0	3790	63.2	4030	67.2	1.01	0.99
360	3670	61.2	3720	62.0	3820	63.7	3970	66.2	4130	68.8	4330	72.2	1.01	0.99
390	4140	69.0	4170	69.5	4260	71.0	4370	72.8	4510	75.2	4670	77.8	1.00	1.00
420	4680	78.0	4710	78.5	4790	79.8	4880	81.3	4990	83.2	5130	85.5	0.99	1.01
450	5310	88.5	5330	88.8	5400	90.0	5490	91.5	5580	93.0	5700	95.0	0.99	1.02
480	6110	101.8	6120	102.0	6170	102.8	6250	104.2	6340	105.7	6440	107.3	0.97	1.03
510	7070	117.8	7080	118.0	7110	118.5	7160	119.3	7230	120.5	7320	122.0	0.97	1.04
540	8240	137.3	8240	137.3	8260	137.7	8290	138.2	8350	139.2	8420	140.3	0.96	1.07
570	9830	163.8	9840	164.0	9870	164.5	9910	165.2	9960	166.0	10,020	167.0	0.93	1.17
MAX ENDURANCE														
KTAS	199		211		232		250		266		281		1.04	0.96
FUEL FLOW	2130		2320		2700		3080		3450		3820		1.05	0.95
MAX RANGE														
KTAS	266		278		310		326		345		383		1.04	0.96
FUEL FLOW	2460		2670		3190		3550		3960		4590		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY

—VMIN LESS THAN 180 KTAS

DRAG INDEX = 150

KTAS	GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	-20°C
MIL														
VMIN	—		—		—		—		—		—			
210	2240	37.3	2420	40.3	2870	47.8	3390	56.5	4050	67.5	4970	82.8	1.08	0.93
240	2400	40.0	2530	42.2	2840	47.3	3230	53.8	3670	61.2	4170	69.5	1.06	0.95
270	2680	44.7	2780	46.3	3010	50.2	3300	55.0	3620	60.3	4000	66.7	1.03	0.97
300	3060	51.0	3130	52.2	3320	55.3	3530	58.8	3780	63.10	4070	67.8	1.02	0.98
330	3500	58.3	3550	59.2	3690	61.5	3860	64.3	4060	67.7	4290	71.5	1.01	0.99
360	4010	66.8	4060	67.7	4160	69.3	4300	71.7	4470	74.5	4670	77.8	1.00	1.00
390	4550	75.8	4580	76.3	4670	77.8	4790	79.8	4930	88.2	5120	85.3	1.00	1.01
420	5200	86.7	5240	87.3	5320	88.7	5420	90.3	5540	92.3	5700	95.0	0.99	1.02
450	5990	99.8	6010	100.2	6090	101.5	6180	103.0	6280	104.7	6400	106.7	0.98	1.03
480	6970	116.2	6970	116.2	7020	117.0	7100	118.3	7190	119.8	7280	121.3	0.97	1.03
510	8100	135.0	8100	135.0	8120	135.3	8170	136.2	8240	137.3	8320	138.7	0.97	1.05
540	9470	157.8	9470	157.8	9470	157.8	9500	158.3	9550	159.2	9610	160.2	0.95	1.07
MAX ENDURANCE														
KTAS	198		210		229		247		260		274		1.04	0.96
FUEL FLOW	2220		2420		2830		3220		3610		4000		1.05	0.95
MAX RANGE														
KTAS	260		269		294		325		332		348		1.04	0.96
FUEL FLOW	2580		2770		3240		3800		4080		4510		1.05	0.95

Figure A4-6. (Sheet 6)

Subsonic Cruise — 4000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (7°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 200

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
MIL														
VMIN	—		—		—		—		—		—			
210	2340	39.0	2520	42.0	2970	49.5	3480	58.0	4160	69.3	5100	85.0	1.10	0.91
240	2540	42.3	2670	44.5	2980	49.7	3360	56.0	3790	63.2	4310	71.8	1.06	0.94
270	2860	47.7	2960	49.3	3190	53.2	3470	57.8	3790	63.2	4170	69.5	1.04	0.96
300	3290	54.8	3370	56.2	3540	59.0	3750	62.5	3990	66.5	4290	71.5	1.03	0.98
330	3780	63.0	3830	63.8	3970	66.2	4140	69.0	4340	72.3	4580	76.3	1.01	0.99
360	4360	72.7	4400	73.3	4510	75.2	4650	77.5	4830	80.5	5050	84.2	1.00	1.00
390	4990	83.2	5020	83.3	5120	85.3	5250	87.5	5410	90.2	5590	93.2	1.00	1.01
420	5790	96.5	5820	97.0	5900	98.3	6000	100.0	6120	102.0	6280	104.7	0.99	1.02
450	6710	111.8	6730	112.2	6810	113.5	6900	115.0	7000	116.7	7110	118.5	0.98	1.03
480	7820	130.3	7830	130.5	7870	131.2	7950	132.5	8030	133.8	8130	135.5	0.97	1.04
510	9140	152.3	9140	152.3	9150	152.5	9200	153.3	9270	154.5	9350	155.8	0.96	1.05
540	10,790	179.8	10,770	179.5	10,760	179.3	10,780	179.7	10,830	180.5	10,900	181.7	0.95	1.08
MAX ENDURANCE														
KTAS	195		204		224		241		255		268		1.04	0.96
FUEL FLOW	2300		2520		2940		3560		3760		4170		1.05	0.95
MAX RANGE														
KTAS	252		261		286		313		326		332		1.04	0.96
FUEL FLOW	2660		2860		3370		3910		4280		4600		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY
—VMIN LESS THAN 180 KTAS

DRAG INDEX = 250

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
MIL														
VMIN	—		—		—		—		—		—			
210	2440	40.7	2620	43.7	3060	51.0	3580	59.7	4270	71.2	5220	87.0	1.10	0.92
240	2680	44.7	2810	46.8	3120	52.0	3480	58.0	3910	65.2	4450	74.2	1.06	0.95
270	3050	50.8	3140	52.3	3370	56.2	3630	60.5	3960	66.0	4340	72.3	1.04	0.97
300	3520	58.7	3590	59.8	3760	62.7	3970	66.2	4210	70.2	4520	75.3	1.02	0.98
330	4060	67.7	4110	68.5	4250	70.8	4410	73.5	4620	77.0	4890	81.5	1.01	1.00
360	4720	78.7	4760	79.3	4880	81.3	5030	83.8	5220	87.0	5440	90.7	1.00	1.00
390	5470	91.2	5510	91.8	5610	93.5	5730	95.5	5890	98.2	6070	101.2	0.99	1.01
420	6380	106.3	6410	106.8	6500	108.3	6590	109.8	6710	111.8	6870	114.5	0.99	1.02
450	7420	123.7	7450	124.2	7520	125.3	7610	126.8	7700	128.3	7810	130.2	0.98	1.03
480	8690	144.8	8690	144.8	8740	145.7	8810	146.8	8900	148.3	8990	149.8	0.97	1.04
510	10,250	170.8	10,250	170.8	10,250	170.8	10,300	171.7	10,370	172.8	10,450	174.2	0.96	1.05
MAX ENDURANCE														
KTAS	190		199		218		235		248		263		1.04	0.96
FUEL FLOW	2390		2610		3050		3480		3900		4340		1.05	0.95
MAX RANGE														
KTAS	248		257		279		300		318		326		1.04	0.96
FUEL FLOW	2760		2980		3470		3960		4440		4830		1.05	0.95

Figure A4-6. (Sheet 7)

Subsonic Cruise — 8000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:

- STANDARD DAY TEMPERATURE (–1°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 0

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
	TOTAL FUEL FLOW													
MIL											8140		0.95	0.98
VMIN	—		—		—		—		—		186		1.07	0.96
210	1890	31.5	2110	35.2	2600	43.3	3210	53.5	4070	67.8	5100	85.0	1.08	0.92
240	1880	31.3	2030	33.8	2400	40.0	2840	47.3	3320	55.3	3980	66.3	1.07	0.94
270	1970	32.8	2080	34.7	2360	39.3	2690	44.8	3080	51.3	3520	58.7	1.05	0.96
300	2140	35.7	2230	37.2	2450	40.8	2710	45.2	3010	50.2	3350	55.8	1.03	0.97
330	2360	39.3	2430	40.5	2610	43.5	2820	47.0	3060	51.0	3330	55.5	1.02	0.98
360	2640	44.0	2700	45.0	2830	47.2	3010	50.2	3210	53.5	3420	57.0	1.01	0.99
390	2930	48.8	2970	49.5	3080	51.3	3220	53.7	3380	56.3	3570	59.5	1.01	1.00
420	3260	54.3	3300	55.0	3380	56.3	3490	58.2	3620	60.3	3780	63.0	1.00	1.00
450	3620	60.3	3650	60.8	3730	62.2	3810	63.5	3910	65.2	4040	67.3	1.00	1.01
480	4070	67.8	4100	68.3	4160	69.3	4230	70.5	4310	71.8	4410	73.5	0.99	1.02
510	4590	76.5	4610	76.8	4650	77.5	4710	78.5	4780	79.7	4870	81.2	0.98	1.03
540	5240	87.3	5260	87.7	5290	88.2	5340	89.0	5410	90.2	5490	91.5	0.97	1.06
570	6190	103.2	6210	103.5	6260	104.3	6330	105.5	6400	106.7	6480	108.0	0.93	1.19
600	8850	147.5	8890	148.2	8960	149.3	9050	150.8	9130	152.2	9200	153.3	0.78	1.39
MAX ENDURANCE														
KTAS	227		243		262		281		301		322		1.04	0.96
FUEL FLOW	1870		2030		2350		2680		3010		3320		1.05	0.95
MAX RANGE														
KTAS	320		322		368		390		418		439		1.04	0.96
FUEL FLOW	2270		2370		2900		3220		3600		3940		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY

—VMIN LESS THAN 180 KTAS

DRAG INDEX = 50

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
MIL											8140		0.98	0.98
VMIN	—		—		—		—		—		190		1.08	0.96
210	1970	32.8	2190	36.5	2680	44.7	3300	55.0	4180	69.7	5210	86.8	1.09	0.93
240	2000	33.3	2150	35.8	2510	41.8	2950	49.2	3430	57.2	4120	68.7	1.06	0.94
270	2130	35.5	2240	37.3	2510	41.8	2840	47.3	3220	53.7	3670	61.2	1.04	0.96
300	2340	39.0	2430	40.5	2650	44.2	2900	48.3	3190	53.2	3530	58.8	1.03	0.97
330	2610	43.5	2680	44.7	2860	47.7	3060	51.0	3290	54.8	3560	59.3	1.01	0.99
360	2950	49.2	3000	50.0	3140	52.3	3300	55.0	3490	58.2	3710	61.8	1.01	0.99
390	3290	54.8	3340	55.7	3440	57.3	3570	59.5	3730	62.2	3930	65.5	1.01	1.00
420	3690	61.5	3730	62.2	3810	63.5	3910	65.2	4050	67.5	4210	70.2	1.00	1.01
450	4130	68.8	4160	69.3	4240	70.7	4320	72.0	4420	73.7	4560	76.0	0.99	1.02
480	4690	78.2	4710	78.5	4770	79.5	4850	80.8	4940	82.3	5050	84.2	0.98	1.03
510	5350	89.2	5370	89.5	5420	90.3	5490	91.5	5570	92.8	5670	94.5	0.97	1.05
540	6230	103.8	6240	104.0	6270	104.5	6330	105.5	6400	106.7	6480	108.0	0.96	1.08
570	7520	125.3	7540	125.7	7590	126.5	7640	127.3	7710	128.5	7790	129.8	0.92	1.23
600	11,180	186.3	11,180	186.3									0.82	1.48
MAX ENDURANCE														
KTAS	217		232		255		270		289		311		1.04	0.96
FUEL FLOW	1970		2140		2490		2840		3190		3530		1.05	0.95
MAX RANGE														
KTAS	295		318		329		380		390		418		1.04	0.96
FUEL FLOW	2300		2570		2850		3470		3740		4180		1.05	0.95

Figure A4-6. (Sheet 8)

Subsonic Cruise — 8000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (−1°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 100

KTAS	TOTAL FUEL FLOW GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	−20°C
MIL											8140		0.90	0.96
VMIN	—		—		—		—		—		187		1.06	0.96
210	2060	34.3	2280	38.0	2770	46.2	3400	56.7	4290	71.5	5330	88.8	1.11	0.91
240	2110	35.2	2270	37.8	2630	43.8	3060	51.0	3550	59.2	4250	70.8	1.07	0.93
270	2280	38.0	2400	40.0	2660	44.3	2990	49.8	3370	56.2	3830	63.8	1.05	0.96
300	2550	425	2640	44.0	2840	47.3	3090	51.5	3380	56.3	3730	62.2	1.03	0.97
330	2860	47.7	2930	48.8	3100	51.7	3300	55.0	3530	58.8	3810	63.5	1.02	0.98
360	3250	54.2	3300	55.0	3430	57.2	3600	60.0	3790	63.2	4020	67.0	1.01	0.99
390	3650	60.8	3690	61.5	3800	63.3	3930	65.5	4100	68.3	4310	71.8	1.01	1.00
420	4130	68.8	4160	69.3	4250	70.8	4350	72.5	4500	75.0	4680	78.0	1.00	1.01
450	4670	77.8	4700	78.3	4790	79.8	4890	81.5	5000	83.3	5150	85.8	0.99	1.02
480	5390	89.8	5420	90.3	5480	91.3	5570	92.8	5660	94.3	5780	96.3	0.98	1.03
510	6230	103.8	6250	104.2	6290	104.8	6360	106.0	6440	107.3	6540	109.0	0.97	1.05
540	7300	121.7	7300	121.7	7320	122.0	7380	123.0	7450	124.2	7530	125.5	0.95	1.08
570	8910	148.5	8930	148.8	8970	149.5	9030	150.5	9080	151.3	9160	152.7	0.91	1.27
MAX ENDURANCE														
KTAS	212		225		246		265		282		299		1.04	0.96
FUEL FLOW	2060		2250		2620		2985		3350		3730		1.05	0.95
MAX RANGE														
KTAS	282		298		322		343		380		386		1.04	0.96
FUEL FLOW	2380		2620		3020		3420		3990		4260		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY
—VMIN LESS THAN 180 KTAS

DRAG INDEX = 150

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	−20°C
MIL											8150		0.90	0.97
VMIN	—		—		—		—		—		187		1.05	0.96
210	2150	35.8	2370	39.5	2850	47.5	3490	58.2	4390	73.2	5450	90.8	1.11	0.91
240	2230	37.2	2390	39.8	2740	45.7	3170	52.8	3680	61.3	4380	73.0	1.06	0.94
270	2440	40.7	2560	42.7	2820	47.0	3130	52.2	3510	58.5	3990	66.5	1.05	0.96
300	2750	45.8	2840	47.3	3040	50.7	3280	54.7	3570	59.5	3940	65.7	1.03	0.97
330	3110	51.8	3180	53.0	3340	55.7	3530	58.8	3770	62.8	4060	67.7	1.02	0.99
360	3550	59.2	3600	60.0	3730	62.2	3900	65.0	4100	68.3	4350	72.5	1.01	0.99
390	4020	67.0	4060	67.7	4170	69.5	4320	72.0	4500	75.0	4720	78.7	1.00	1.01
420	4600	76.7	4640	77.3	4740	79.0	4850	80.8	5010	83.5	5190	86.5	0.99	1.02
450	5280	88.0	5320	88.7	5410	90.2	5500	91.7	5620	93.7	5770	96.2	0.98	1.03
480	6140	102.3	6160	102.7	6220	103.7	6310	105.2	6400	106.7	6510	108.5	0.97	1.03
510	7130	118.8	7140	119.0	7180	119.7	7240	120.7	7320	122.0	7410	123.5	0.97	1.05
540	8380	139.7	8380	139.7	8390	139.8	8450	140.8	8510	141.8	8600	143.3	0.95	1.10
MAX ENDURANCE														
KTAS	212		223		243		260		276		293		1.04	0.96
FUEL FLOW	2150		2350		2740		3120		3510		3930		1.05	0.95
MAX RANGE														
KTAS	270		286		321		329		347		372		1.04	0.96
FUEL FLOW	2440		2700		3230		3530		3950		4490		1.05	0.95

Figure A4-6. (Sheet 9)

Subsonic Cruise — 8000 Feet

DATA BASIS: FLIGHT TEST **CONDITIONS:** **ENGINE: F100-PW-200**

- **STANDARD DAY TEMPERATURE (–9°C)**

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 200

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	–20°C
MIL											8150		0.91	0.98
VMIN	—		—		—		—		—		188		1.05	0.96
210	2240	37.3	2450	40.8	2940	49.0	3590	59.8	4500	75.0	5580	93.0	1.11	0.89
240	2360	39.3	2510	41.8	2860	47.7	3280	54.7	3810	63.5	4510	75.2	1.08	0.93
270	2600	43.3	2710	45.2	2970	49.5	3280	54.7	3670	61.2	4150	69.2	1.05	0.95
300	2950	49.2	3030	50.5	3230	53.8	3470	57.8	3770	62.8	4150	69.2	1.03	0.97
330	3360	56.0	3420	57.0	3580	59.7	3780	63.0	4030	67.2	4330	72.2	1.02	0.99
360	3860	64.3	3910	65.2	4040	67.3	4220	70.3	4440	74.0	4690	78.2	1.01	1.00
390	4420	73.7	4470	74.5	4580	76.3	4740	79.0	4920	82.0	5140	85.7	1.00	1.01
420	5120	85.3	5160	86.0	5250	87.5	5360	89.3	5520	92.0	5700	95.0	0.99	1.01
450	5910	98.5	5950	99.2	6040	100.7	6130	102.2	6240	104.0	6390	106.5	0.98	1.03
480	6890	114.8	6910	115.2	6970	116.2	7060	117.7	7150	119.2	7260	121.0	0.97	1.03
510	8050	134.2	8050	134.2	8090	134.8	8150	135.8	8230	137.2	8320	138.7	0.96	1.05
540	9560	159.3	9560	159.3	9560	159.3	9610	160.2	9680	161.3	9760	162.7	0.95	1.10
MAX ENDURANCE														
KTAS	206		217		237		254		270		285		1.04	0.96
FUEL FLOW	2240		2450		2850		3250		3670		4120		1.05	0.95
MAX RANGE														
KTAS	267		276		309		322		333		359		1.04	0.96
FUEL FLOW	2570		2770		3320		3680		4070		4670		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY

—VMIN LESS THAN 180 KTAS

DRAG INDEX = 250

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	–20°C
MIL											8150		0.90	0.94
VMIN	—		—		—		—		—		188		1.10	0.96
210	2330	38.8	2540	42.3	3020	50.3	3690	61.5	4610	76.8	5700	95.0	1.10	0.90
240	2480	41.3	2620	43.7	2970	49.5	3390	56.5	3940	65.7	4640	77.3	1.08	0.93
270	2760	46.0	2870	47.8	3120	52.0	3430	57.2	3830	63.8	4310	71.8	1.05	0.96
300	3150	52.5	3230	53.8	3420	57.0	3670	61.2	3980	66.3	4360	72.7	1.03	0.97
330	3610	60.2	3670	61.2	3840	64.0	4050	67.5	4300	71.7	4600	76.7	1.01	0.99
360	4190	69.8	4240	70.7	4390	73.2	4570	76.2	4780	79.7	5030	83.8	1.00	1.00
390	4850	80.8	4900	81.7	5010	83.5	5160	86.0	5340	89.0	5550	92.5	1.00	1.01
420	5640	94.0	5680	94.7	5770	96.2	5880	98.0	6030	100.5	6210	103.5	0.99	1.02
450	6550	109.2	6580	109.7	6670	111.2	6750	112.5	6860	114.3	7010	116.8	0.98	1.03
480	7650	127.5	7670	127.8	7730	128.8	7820	130.3	7910	131.8	8030	133.8	0.97	1.04
510	9030	150.5	9030	150.5	9070	151.2	9120	152.0	9200	153.3	9300	155.0	0.96	1.06
MAX ENDURANCE														
KTAS	201		212		231		249		265		278		1.04	0.96
FUEL FLOW	2320		2540		2960		3380		3830		4300		1.05	0.95
MAX RANGE														
KTAS	259		270		296		315		323		342		1.04	0.96
FUEL FLOW	2640		2870		3370		3840		4210		4760		1.05	0.95

Figure A4-6. (Sheet 10)

Subsonic Cruise — 12,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:

ENGINE: F100-PW-200

- STANDARD DAY TEMPERATURE (–9°C)

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX	KTAS	TOTAL FUEL FLOW: GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
DRAG INDEX = 0	MIL											7140		0.96	0.96
	VMIN	—		—		—		—		—		202		1.06	0.96
	210	1880	31.3	2120	35.3	2680	44.7	3510	58.5	4530	75.5	6000	100.0	1.11	0.91
	240	1800	30.0	1970	32.8	2390	39.8	2860	39.3	3530	58.8	4390	73.2	1.08	0.93
	270	1840	30.7	1970	32.8	2280	38.0	2650	44.2	3100	51.7	3620	60.3	1.06	0.95
	300	1960	32.7	2060	34.3	2300	38.3	2590	43.2	2930	48.8	3360	56.0	1.04	0.96
	330	2130	35.5	2220	37.0	2410	40.2	2640	44.0	2910	48.5	3240	54.0	1.03	0.98
	360	2350	39.2	2420	40.3	2580	43.0	2770	46.2	2990	49.8	3240	54.0	1.02	0.98
	390	2590	43.2	2640	44.0	2770	46.2	2930	48.8	3120	52.0	3330	55.5	1.01	0.99
	420	2880	48.0	2920	48.7	3020	50.3	3140	52.3	3300	55.0	3480	58.0	1.00	1.00
	450	3200	53.3	3240	54.0	3320	55.3	3420	57.0	3540	59.0	3700	61.7	1.00	1.01
	480	3590	59.8	3620	60.3	3690	61.5	3780	63.0	3880	64.7	4010	66.8	0.99	1.02
	510	4040	67.3	4060	67.7	4120	68.7	4190	69.8	4280	71.3	4380	73.0	0.98	1.03
	540	4620	77.0	4640	77.3	4700	78.3	4770	79.5	4850	80.8	4950	82.5	0.96	1.07
	570	5500	91.7	5530	92.2	5590	93.2	5670	94.5	5750	95.8	5850	97.5	0.93	1.32
	600	8760	146.0	8780	146.3	8850	147.5	8920	148.7	9010	150.2	9120	152.0	0.74	1.36
	MAX ENDURANCE														
	KTAS	245		254		277		302		318		341		1.04	0.96
	FUEL FLOW	1800		1960		2280		2590		2900		3230		1.05	0.95
	MAX RANGE														
	KTAS	318		340		381		412		437		444		1.04	0.96
	FUEL FLOW	2050		2280		2700		3080		3430		3640		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY

—VMIN LESS THAN 180 KTAS

DRAG INDEX	KTAS	18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	+20°C	-20°C
DRAG INDEX = 50	MIL									7060		7140		0.97	0.97
	VMIN	—		—		—		—		187		203		1.07	0.96
	210	1960	32.7	2190	36.5	2760	46.0	3600	60.0	4640	77.3	6140	102.3	111	0.91
	240	1900	31.7	2080	34.7	2490	41.5	2970	49.5	3640	60.7	4510	75.2	1.07	0.93
	270	1980	33.0	2100	35.0	2410	40.2	2780	46.3	3240	54.0	3770	62.8	1.05	0.95
	300	2130	35.5	2240	37.3	2470	41.2	2760	46.0	3110	51.8	3540	59.0	1.04	0.97
	330	2350	39.2	2430	40.5	2620	43.7	2850	47.5	3120	52.0	3460	57.7	1.02	0.98
	360	2610	43.5	2680	44.7	2840	47.3	3030	50.5	3250	54.2	3520	58.7	1.01	0.98
	390	2910	48.5	2960	49.3	3080	51.3	3240	54.0	3440	57.3	3660	61.0	1.01	1.00
	420	3260	54.3	3300	55.0	3390	56.5	3520	58.7	3690	61.5	3890	64.8	1.00	1.01
	450	3650	60.8	3690	61.5	3780	63.0	3880	64.7	4020	67.0	4190	69.8	0.99	1.02
	480	4140	69.0	4180	69.7	4260	71.0	4350	72.5	4460	74.3	4610	76.8	0.98	1.03
	510	4740	79.0	4760	79.3	4820	80.3	4910	81.8	5000	83.3	5120	85.3	0.97	1.05
	540	5510	91.8	5530	92.2	5580	93.0	5660	94.3	5740	95.7	5840	97.3	0.96	1.09
	570	6750	112.5	6770	112.8	6830	113.8	6900	115.0	6980	116.3	7070	117.8	0.91	1.37
	MAX ENDURANCE														
	KTAS	234		249		266		290		314		329		1.04	0.96
	FUEL FLOW	1900		2070		2410		2750		3100		3460		1.05	0.95
	MAX RANGE														
	KTAS	317		321		373		387		412		430		1.04	0.96
	FUEL FLOW	2240		2360		2930		3210		3610		3980		1.05	0.95

Figure A4-6. (Sheet 11)

Subsonic Cruise — 12,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (-9°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 100

KTAS	TOTAL FUEL FLOW GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
MIL									7060		7150		0.93	0.96
VMIN	—		—		—		—		188		204		1.06	0.96
210	2030	33.8	2260	37.7	2840	47.3	3690	61.5	4750	79.2	6280	104.7	1.11	0.89
240	2010	33.5	2180	36.3	2590	43.2	3080	51.3	3750	62.5	4630	77.2	1.09	0.93
270	2110	35.2	2240	37.3	2540	42.3	2910	48.5	3380	56.3	3910	65.2	1.07	0.95
300	2310	38.5	2410	40.2	2640	44.0	2920	48.7	3290	54.8	3720	62.0	1.04	0.96
330	2570	42.8	2650	44.2	2830	47.2	3060	51.0	3350	55.8	3700	61.7	1.03	0.98
360	2880	48.0	2940	49.0	3100	51.7	3290	54.8	3530	58.8	3810	63.5	1.02	0.98
390	3230	53.8	3280	54.7	3400	56.7	3570	59.5	3780	63.0	4020	67.0	1.01	1.00
420	3650	60.8	3690	61.5	3800	63.3	3940	65.7	4120	68.7	4330	72.2	1.00	1.01
450	4150	69.2	4200	70.0	4290	71.5	4400	73.3	4550	75.8	4720	78.7	0.99	1.02
480	4780	79.7	4810	80.2	4890	81.5	4980	83.0	5100	85.0	5250	87.5	0.98	1.03
510	5500	91.7	5530	92.2	5590	93.2	5670	94.5	5760	96.0	5870	97.8	0.97	1.05
540	6450	107.5	6460	107.7	6510	108.5	6580	109.7	6670	111.2	6770	112.8	0.95	1.10
570	8070	134.5	8090	134.8	8150	135.8	8210	136.8	8280	138.0	8380	139.7	0.90	1.40
MAX ENDURANCE														
KTAS	227		240		262		281		303		317		1.04	0.96
FUEL FLOW	2000		2180		2540		2900		3280		3680		1.05	0.95
MAX RANGE														
KTAS	307		317		337		379		381		408		1.04	0.96
FUEL FLOW	2360		2530		2890		3460		3700		4190		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY
—VMIN LESS THAN 180 KTAS

DRAG INDEX = 150

KTAS	18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	+20°C	-20°C
MIL									7060		7150		0.93	0.96
VMIN	—		—		—		—		189		205		1.06	0.96
210	2100	35.0	2340	39.0	2930	48.8	3790	63.2	4850	80.8	6440	107.3	1.11	0.89
240	2110	35.2	2280	38.0	2680	44.7	3190	53.2	3870	64.5	4760	79.3	1.09	0.93
270	2250	37.5	2370	39.5	2670	44.5	3050	50.8	3520	58.7	4060	67.7	1.06	0.95
300	2480	41.3	2580	43.0	2810	46.8	3100	51.7	3470	57.8	3900	65.0	1.04	0.96
330	2780	46.3	2860	47.7	3040	50.7	3280	54.7	3580	59.7	3930	65.5	1.02	0.98
360	3140	52.3	3210	53.5	3370	56.2	3570	59.5	3820	63.7	4100	68.3	1.01	0.99
390	3560	59.3	3610	60.2	3750	62.5	3930	65.5	4140	69.0	4380	73.0	1.00	1.00
420	4080	68.0	4130	68.8	4240	70.7	4380	73.0	4560	76.0	4760	79.3	0.99	1.01
450	4690	78.2	4740	79.0	4830	80.5	4930	82.2	5080	84.7	5260	87.7	0.99	1.03
480	5430	90.5	5460	91.0	5540	92.3	5630	93.8	5740	95.7	5890	98.2	0.98	1.03
510	6280	104.7	6300	105.0	6360	106.0	6440	107.3	6530	108.8	6640	110.7	0.97	1.05
540	7420	123.7	7420	123.7	7470	124.5	7540	125.7	7630	127.2	7730	128.8	0.95	1.12
MAX ENDURANCE														
KTAS	225		237		257		276		295		312		1.04	0.96
FUEL FLOW	2080		2280		2650		3050		3470		3890		1.05	0.95
MAX RANGE														
KTAS	292		312		323		344		374		390		1.04	0.96
FUEL FLOW	2410		2670		2980		3410		3960		4380		1.05	0.95

Figure A4-6. (Sheet 12)

Subsonic Cruise — 12,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (−9°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

	KTAS	TOTAL FUEL FLOW: GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
		LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	−20°C
DRAG INDEX = 200	MIL									7070		7150		0.93	0.96
	VMIN	—		—		—		—		189		205		1.06	0.96
	210	2180	36.3	2410	40.2	3010	50.2	3880	64.7	4960	82.7	6590	109.8	1.14	0.88
	240	2210	36.8	2380	39.7	2780	46.3	3300	55.0	3980	66.3	4890	81.5	1.11	0.91
	270	2380	39.7	2500	41.7	2800	46.7	3190	53.2	3660	61.0	4200	70.0	1.07	0.94
	300	2650	44.2	2750	45.8	2980	49.7	3280	54.7	3650	60.8	4080	68.0	1.05	0.96
	330	3000	50.0	3070	51.2	3270	54.5	3520	58.7	3810	63.5	4160	69.3	1.03	0.98
	360	3420	57.0	3490	58.2	3660	61.0	3870	64.5	4110	68.5	4390	73.2	1.02	0.99
	390	3930	65.5	3980	66.3	4120	68.7	4290	71.5	4500	75.0	4740	79.0	1.01	1.00
	420	4530	75.5	4580	76.3	4680	78.0	4830	80.5	5000	83.3	5210	86.8	1.00	1.01
	450	5240	87.3	5280	88.0	5370	89.5	5480	91.3	5630	93.8	5800	96.7	0.98	1.02
	480	6090	101.5	6120	102.0	6200	103.3	6280	104.7	6390	106.5	6540	109.0	0.98	1.03
	510	7090	118.2	7110	118.5	7170	119.5	7250	120.8	7340	122.3	7460	124.3	0.96	1.06
	540	8480	141.3	8180	136.3	8520	142.0	8590	143.2	8670	144.5	8770	146.2	0.95	1.12
	MAX ENDURANCE														
	KTAS	219		230		251		268		286		303		1.04	0.96
	FUEL FLOW	2170		2370		2770		3190		3640		4080		1.05	0.95
	MAX RANGE														
	KTAS	282		300		317		332		362		380		1.04	0.96
	FUEL FLOW	2480		2740		3120		3530		4140		4600		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY
—VMIN LESS THAN 180 KTAS

	KTAS	GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
		LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	−20°C
DRAG INDEX = 250	MIL									7070		7160		0.92	0.94
	VMIN	—		—		—		—		190		206		1.09	0.96
	210	2250	37.5	2480	41.3	3100	51.7	3970	66.2	5070	84.5	6740	112.3	1.14	0.88
	240	2310	38.5	2480	41.3	2880	48.0	3410	56.8	4100	68.3	5020	83.7	1.11	0.91
	270	2520	42.0	2640	44.0	2940	49.0	3330	55.5	3800	63.3	4350	72.5	1.06	0.94
	300	2820	47.0	2920	48.7	3160	52.7	3470	57.8	3840	64.0	4260	71.0	1.04	0.96
	330	3220	53.7	3310	55.2	3500	58.3	3750	62.5	4050	67.5	4390	73.2	1.02	0.98
	360	3720	62.0	3800	63.3	3960	66.0	4170	69.5	4410	73.5	4690	78.2	1.01	0.99
	390	4300	71.7	4350	72.5	4480	74.7	4660	77.7	4870	81.2	5110	85.2	1.00	1.00
	420	4990	83.2	5030	83.8	5140	85.7	5280	88.0	5450	90.8	5650	94.2	0.99	1.01
	450	5790	96.5	5830	97.2	5920	98.7	6020	100.3	6170	102.8	6350	105.8	0.98	1.03
	480	6770	112.8	6800	113.3	6880	114.7	6970	116.2	7080	118.0	7240	120.7	0.97	1.04
	510	7960	132.7	7980	133.0	8030	133.8	8110	135.2	8200	136.7	8310	138.5	0.96	1.06
	MAX ENDURANCE														
	KTAS	213		224		246		265		279		292		1.04	0.96
	FUEL FLOW	2250		2460		2880		3330		3790		4260		1.05	0.95
	MAX RANGE														
	KTAS	274		287		309		322		343		369		1.04	0.96
	FUEL FLOW	2550		2790		3250		3650		4190		4800		1.05	0.95

Figure A4-6. (Sheet 13)

Subsonic Cruise — 16,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:

ENGINE: F100-PW-200

- STANDARD DAY TEMPERATURE (−17°C)

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 0

KTAS	TOTAL FUEL FLOW GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	−20°C
MIL							6050		6140		6240		0.98	0.95
VMIN	—		—		—		187		205		223		1.05	0.96
210	1890	31.5	2160	36.0	2920	48.7	3910	65.2	5410	90.2			1.12	0.88
240	1750	29.2	1960	32.7	2420	40.3	3050	50.8	3900	65.0	5000	83.3	1.10	0.92
270	1740	29.0	1890	31.5	2240	37.3	2690	44.8	3210	53.5	3870	64.5	1.08	0.93
300	1810	30.2	1930	32.2	2200	36.7	2540	42.3	2960	49.3	3440	57.3	1.05	0.95
330	1940	32.3	2040	34.0	2250	37.5	2520	42.0	2850	47.5	3250	54.2	1.04	0.97
360	2100	35.0	2180	36.3	2360	39.3	2580	43.0	2840	47.3	3170	52.8	1.03	0.97
390	2300	38.3	2360	39.3	2510	41.8	2700	45.0	2910	48.5	3180	53.0	1.02	0.98
420	2550	42.5	2600	43.3	2710	45.2	2870	47.8	3050	50.8	3280	54.7	1.01	1.00
450	2840	47.3	2880	48.0	2970	49.5	3100	51.7	3260	54.3	3450	57.5	1.00	1.01
480	3180	53.0	3210	53.5	3300	55.0	3400	56.7	3530	58.8	3690	61.5	0.99	1.01
510	3570	59.5	3600	60.0	3670	61.2	3770	62.8	3880	64.7	4020	67.0	0.98	1.04
540	4110	68.5	4140	69.0	4210	70.2	4300	71.7	4410	73.5	4540	75.7	0.96	1.07
570	5150	85.8	5190	86.5	5250	87.5	5320	88.7	5420	90.3	5550	92.5	0.89	1.38
600	8430	140.5	8460	141.0	8550	142.5	8660	144.3	8790	146.5	8940	149.0	0.71	1.34
MAX ENDURANCE														
KTAS	259		272		299		319		352		374		1.04	0.96
FUEL FLOW	1730		1890		2200		2510		2840		3160		1.05	0.95
MAX RANGE														
KTAS	367		374		402		429		437		457		1.04	0.96
FUEL FLOW	2140		2260		2580		2920		3160		3500		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY

—VMIN LESS THAN 180 KTAS

DRAG INDEX = 50

KTAS	GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	−20°C
MIL							6060		6150		6250		0.98	0.96
VMIN	—		—		—		187		205		225		1.06	0.96
210	1950	32.5	2230	37.2	3000	50.0	4000	66.7	5540	92.3			1.12	0.88
240	1840	30.7	2040	34.0	2510	41.8	3150	52.5	4010	66.8	5140	85.7	1.09	0.92
270	1860	31.0	2010	33.5	2360	39.3	2810	46.8	3340	55.7	4000	66.7	1.07	0.94
300	1960	32.7	2070	34.5	2340	39.0	2690	44.8	3120	52.0	3600	60.0	1.05	0.96
330	2130	35.5	2220	37.0	2430	40.5	2710	45.2	3050	50.8	3450	57.5	1.03	0.98
360	2330	38.8	2410	40.2	2590	43.2	2810	46.8	3090	51.5	3420	57.0	1.02	0.98
390	2580	43.0	2640	44.0	2790	46.5	2980	49.7	3220	53.7	3490	58.2	1.01	0.99
420	2880	48.0	2930	48.8	3060	51.0	3220	53.7	3420	57.0	3650	60.8	1.00	1.00
450	3260	54.3	3300	55.0	3400	56.7	3530	58.8	3700	61.7	3900	65.0	0.99	1.01
480	3680	61.3	3720	62.0	3820	63.7	3920	65.3	4070	67.8	4240	70.7	0.98	1.02
510	4200	70.0	4230	70.5	4320	72.0	4410	73.5	4530	75.5	4670	77.8	0.97	1.04
540	4910	81.8	4940	82.3	5010	83.5	5090	84.8	5200	86.7	5330	88.8	0.95	1.10
570	6400	106.7	6430	107.2	6480	108.0	6550	109.2	6650	110.8	6770	112.8	0.86	1.44
MAX ENDURANCE														
KTAS	250		262		290		312		331		357		1.04	0.96
FUEL FLOW	1830		2000		2340		2680		3050		3420		1.05	0.95
MAX RANGE														
KTAS	327		363		378		406		426		437		1.04	0.96
FUEL FLOW	2110		2430		2700		3100		3470		3770		1.05	0.95

Figure A4-6. (Sheet 14)

Subsonic Cruise — 16,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (–17°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 100

KTAS	TOTAL FUEL FLOW — GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
MIL							6060		6150		6260		0.96	0.95
VMIN	—		—		—		188		206		227		1.05	0.96
210	2020	33.7	2300	38.3	3080	51.3	4100	68.3	5670	94.5			1.15	0.88
240	1930	32.2	2130	35.5	2600	43.3	3250	54.2	4120	68.7	5280	88.0	1.12	0.90
270	1970	32.8	2120	35.3	2480	41.3	2930	48.8	3460	57.7	4140	69.0	1.08	0.93
300	2110	35.2	2220	37.0	2490	41.5	2850	47.5	3280	54.7	3760	62.7	1.06	0.95
330	2310	38.5	2400	40.0	2630	43.8	2910	48.5	3250	54.2	3650	60.8	1.04	0.97
360	2560	42.7	2640	44.0	2830	47.2	3060	51.0	3340	55.7	3670	61.2	1.03	0.98
390	2860	47.7	2930	48.8	3090	51.5	3290	54.8	3530	58.8	3790	63.2	1.01	0.99
420	3250	54.2	3300	55.0	3430	57.2	3600	60.0	3800	63.3	4030	67.2	1.00	1.00
450	3710	61.8	3750	62.5	3850	64.2	3990	66.5	4160	69.3	4360	72.7	0.99	1.02
480	4240	70.7	4280	71.3	4370	72.8	4470	74.5	4620	77.0	4790	79.8	0.98	1.02
510	4860	81.0	4900	81.7	4980	83.0	5070	84.5	5190	86.5	5340	89.0	0.97	1.05
540	5740	95.7	5770	96.2	5830	97.2	5920	98.7	6020	100.3	6150	102.5	0.95	1.12
570	7760	129.3	7790	129.8	7840	130.7	7900	131.7	8010	133.5	8140	135.7	0.83	1.45
MAX ENDURANCE														
KTAS	242		254		280		302		318		337		1.04	0.96
FUEL FLOW	1930		2100		2470		2850		3240		3640		1.05	0.95
MAX RANGE														
KTAS	312		328		371		378		406		424		1.04	0.96
FUEL FLOW	2180		2390		2910		3190		3650		4060		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY

—VMIN LESS THAN 180 KTAS

DRAG INDEX = 150

KTAS	18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	+20°C	-20°C
MIL							6060		6150		6270		0.96	0.95
VMIN	—		—		—		189		207		229		1.07	0.96
210	2080	34.7	2370	39.5	3160	52.7	4190	69.8	5800	96.7			1.15	0.88
240	2020	33.7	2210	36.8	2700	45.0	3350	55.8	4230	70.5	5420	90.3	1.11	0.90
270	2090	34.8	2230	37.2	2600	43.3	3060	51.0	3590	59.8	4270	71.2	1.07	0.93
300	2250	37.5	2370	39.5	2650	44.2	3010	50.2	3430	57.2	3920	65.3	1.05	0.95
330	2500	41.7	2590	43.2	2820	47.0	3110	51.8	3450	57.5	3850	64.2	1.03	0.97
360	2800	46.7	2880	48.0	3080	51.3	3320	55.3	3590	59.8	3920	65.3	1.02	0.98
390	3170	52.8	3240	54.0	3400	56.7	3600	60.0	3830	63.8	4110	68.5	1.01	1.00
420	3630	60.5	3680	61.3	3810	63.5	3980	66.3	4180	69.7	4410	73.5	1.00	1.01
450	4170	69.5	4220	70.3	4320	72.0	4460	74.3	4630	77.2	4830	80.5	0.98	1.02
480	4800	80.0	4840	80.7	4930	82.2	5040	84.0	5180	86.3	5350	89.2	0.98	1.03
510	5550	92.5	5580	93.0	5660	94.3	5750	95.8	5860	97.7	6020	100.3	0.97	1.05
540	6620	110.3	6640	110.7	6710	111.8	6790	113.2	6900	115.0	7030	117.2	0.94	1.14
MAX ENDURANCE														
KTAS	239		250		274		294		312		327		1.04	0.96
FUEL FLOW	2020		2200		2600		3000		3420		3850		1.05	0.95
MAX RANGE														
KTAS	312		312		348		374		389		407		1.04	0.96
FUEL FLOW	2340		2440		2970		3440		3830		4250		1.05	0.95

Figure A4-6. (Sheet 15)

Subsonic Cruise — 16,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (−17°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 200

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	−20°C
	TOTAL FUEL FLOW													
MIL							6070		6160		6270		0.95	0.94
VMIN	—		—		—		189		208		231		1.07	0.96
210	2140	35.7	2440	40.7	3240	54.0	4280	71.3	5950	99.2			1.17	0.85
240	2100	35.0	2300	38.3	2790	46.5	3450	57.5	4340	72.3	5570	92.8	1.13	0.88
270	2200	36.7	2350	39.2	2720	45.3	3180	53.0	3720	62.0	4410	73.5	1.09	0.93
300	2400	40.0	2520	42.0	2810	46.8	3170	52.8	3590	59.8	4080	68.0	1.06	0.95
330	2700	45.0	2790	46.5	3030	50.5	3310	55.2	3650	60.8	4050	67.5	1.04	0.97
360	3050	50.8	3140	52.3	3340	55.7	3570	59.5	3850	64.2	4180	69.7	1.03	0.98
390	3490	58.2	3550	59.2	3720	62.0	3920	65.3	4150	69.2	4420	73.7	1.01	1.00
420	4020	67.0	4070	67.8	4200	70.0	4370	72.8	4570	76.2	4800	80.0	1.00	1.00
450	4650	77.5	4690	78.2	4790	79.8	4930	82.2	5100	85.0	5300	88.3	0.99	1.02
480	5380	89.7	5420	90.3	5500	91.7	5610	93.5	5760	96.0	5940	99.0	0.98	1.03
510	6260	104.3	6290	114.8	6370	106.2	6470	107.8	6590	109.8	6750	112.5	0.97	1.06
540	7560	126.0	7580	126.3	7640	127.3	7730	128.8	7830	130.5	7970	132.8	0.95	1.17
	MAX ENDURANCE													
KTAS	233		245		266		287		305		319		1.04	0.96
FUEL FLOW	2098		2300		2720		3150		3590		4040		1.05	0.95
	MAX RANGE													
KTAS	298		312		327		361		375		397		1.04	0.96
FUEL FLOW	2390		2610		3000		3580		3980		4500		1.05	0.95

*TEMPERATURE DEVIATION FROM STANDARD DAY

—VMIN LESS THAN 180 KTAS

DRAG INDEX = 250

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	−20°C
MIL							6070		6170		6280		0.95	0.94
VMIN	—		—		—		190		209		232		1.08	0.96
210	2210	36.8	2510	41.8	3320	55.3	4380	73.0	6090	101.5			1.15	0.85
240	2190	36.5	2390	39.8	2890	48.2	3550	59.2	4460	74.3	5710	95.2	1.12	0.89
270	2320	38.7	2470	41.2	2840	47.3	3300	55.0	3840	64.0	4550	75.8	1.09	0.93
300	2560	42.7	2680	44.7	2970	49.5	3330	55.5	3750	62.5	4240	70.7	1.05	0.95
330	2900	48.3	3000	50.0	3230	53.8	3510	58.5	3860	64.3	4250	70.8	1.03	0.97
360	3320	55.3	3400	56.7	3590	59.8	3820	63.7	4100	68.3	4430	73.8	1.02	0.99
390	3810	63.5	3870	64.5	4030	76.2	4240	70.7	4470	74.5	4740	79.0	1.01	1.00
420	4420	73.7	4470	74.5	4590	76.5	4760	79.3	4960	82.7	5190	86.0	0.99	1.01
450	5130	85.5	5180	86.3	5270	87.8	5410	90.2	5590	93.2	5800	96.7	0.98	1.03
480	5980	99.7	6020	100.3	6110	101.8	6220	103.7	6370	106.5	6560	109.3	0.97	1.03
510	7010	116.8	7040	117.3	7120	118.7	7220	120.3	7350	122.5	7530	125.5	0.96	1.07
	MAX ENDURANCE													
KTAS	228		239		261		279		294		312		1.04	0.96
FUEL FLOW	2180		2392		2830		3290		3750		4220		1.05	0.95
	MAX RANGE													
KTAS	291		302		318		350		373		383		1.04	0.96
FUEL FLOW	2480		2670		3110		3710		4240		4660		1.05	0.95

Figure A4-6. (Sheet 16)

Subsonic Cruise — 20,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (−25°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 0

KTAS	GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	TOTAL FUEL FLOW													
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	−20°C
MIL					5140		5230		5332		5450		1.00	0.94
VMIN	—		—		185		205		228		252		1.05	0.96
210	1960	32.7	2320	38.7	3240	54.0	4710	78.5					1.16	0.88
240	1750	29.2	1980	33.0	2550	42.5	3380	56.3	4540	75.7			1.13	0.89
270	1680	28.0	1850	30.8	2280	38.0	2780	46.3	3450	57.5	4450	74.2	1.08	0.92
300	1690	28.2	1820	30.3	2150	35.8	2560	42.7	3030	50.5	3580	59.7	1.07	0.94
330	1780	29.7	1890	31.5	2140	35.7	2470	41.2	2870	47.8	3320	55.3	1.05	0.95
360	1900	31.7	1990	33.2	2200	36.7	2460	41.0	2780	46.3	3160	52.7	1.04	0.96
390	2050	34.2	2120	35.3	2300	38.3	2520	42.0	2790	46.5	3100	51.7	1.03	0.98
420	2250	37.5	2310	38.5	2460	41.0	2640	44.0	2870	47.8	3130	52.2	1.02	0.99
450	2510	41.8	2550	42.5	2670	44.5	2830	47.2	3020	50.3	3250	54.2	1.00	1.00
480	2800	46.7	2840	47.3	2950	49.2	3080	51.3	3240	54.0	3430	57.2	0.99	1.02
510	3180	53.0	3210	53.5	3310	55.2	3420	57.0	3560	59.3	3720	62.0	0.97	1.03
540	3660	61.0	3700	61.7	3780	63.0	3890	64.8	4030	67.2	4180	69.7	0.96	1.14
570	4930	82.2	4950	82.5	5020	83.7	5110	85.2	5250	87.5	5400	90.0	0.83	1.44
600	8180	136.3	8230	137.2	8350	139.2	8510	141.8	8700	145.0	8870	147.8	0.72	1.26
MAX ENDURANCE														
KTAS	281		293		318		352		371		396		1.04	0.96
FUEL FLOW	1670		1820		2140		2450		2770		3100		1.05	0.94
MAX RANGE														
KTAS	371		395		420		431		458		480		1.04	0.96
FUEL FLOW	1950		2150		2460		2700		3070		3430		1.05	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY
—VMIN LESS THAN 180 KTAS

DRAG INDEX = 50

KTAS	GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	−20°C
MIL					5140		5230		5340		5460		1.00	0.95
VMIN	—		—		185		206		230		254		1.05	0.96
210	2020	33.7	2390	39.8	3320	55.3	4820	80.3					1.15	0.88
240	1820	30.3	2060	34.3	2640	44.0	3470	57.8	4670	77.8			1.12	0.90
270	1780	29.7	1950	32.5	2380	39.7	2890	48.2	3560	59.3	4590	76.5	1.08	0.92
300	1820	30.3	1950	32.5	2290	38.2	2700	45.0	3180	53.0	3730	62.2	1.06	0.94
330	1940	32.3	2050	34.2	2310	38.5	2640	44.0	3040	50.7	3490	58.2	1.04	0.96
360	2090	34.8	2190	36.5	2400	40.0	2670	44.5	3000	50.0	3380	56.3	1.03	0.98
390	2300	38.3	2370	39.5	2560	42.7	2790	46.5	3050	50.8	3370	56.2	1.02	0.98
420	2560	42.7	2610	43.5	2770	46.2	2960	49.3	3190	53.2	3460	57.7	1.01	1.00
450	2880	48.0	2930	48.8	3050	50.8	3220	53.7	3410	56.8	3640	60.7	0.99	1.01
480	3270	54.5	3310	55.2	3410	56.8	3540	59.0	3710	61.8	3900	65.0	0.99	1.03
510	3730	62.2	3770	62.8	3860	64.3	3970	66.2	4120	68.7	4290	71.5	0.97	1.05
540	4370	78.8	4410	73.5	4490	74.8	4590	76.5	4720	78.7	4890	81.5	0.94	1.18
570	6170	102.8	6200	103.3	6260	104.3	6360	106.0	6500	108.3	6670	111.2	0.80	1.51
MAX ENDURANCE														
KTAS	269		287		307		330		360		377		1.04	0.96
FUEL FLOW	1780		1940		2280		2640		3000		3360		1.05	0.94
MAX RANGE														
KTAS	366		369		399		424		435		460		1.04	0.96
FUEL FLOW	2130		2230		2620		2990		3290		3720		1.05	0.94

Figure A4-6. (Sheet 17)

Subsonic Cruise — 20,000 Feet

DATA BASIS: FLIGHT TEST **CONDITIONS:** **ENGINE: F100-PW-200**

- **STANDARD DAY TEMPERATURE (–25°C)**

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 100

KTAS	TOTAL FUEL FLOW — GROSS WEIGHT 18,000 LB LB/HR	18,000 LB LB/MIN	20,000 LB LB/HR	20,000 LB LB/MIN	24,000 LB LB/HR	24,000 LB LB/MIN	28,000 LB LB/HR	28,000 LB LB/MIN	32,000 LB LB/HR	32,000 LB LB/MIN	36,000 LB LB/HR	36,000 LB LB/MIN	TEMP* EFFECT FACTOR +20°C	TEMP* EFFECT FACTOR –20°C
MIL					5140		5240		5350		5470		0.99	0.94
VMIN	—		—		186		207		232		256		1.06	0.96
210	2080	34.7	2450	40.8	3390	56.5	4940	82.3					1.17	0.84
240	1900	31.7	2140	35.7	2720	45.3	3570	59.5	4790	79.8			1.13	0.88
270	1880	31.3	2050	34.2	2480	41.3	3000	50.0	3680	61.3	4740	79.0	1.10	0.92
300	1950	32.5	2080	34.7	2420	40.3	2830	47.2	3320	55.3	3880	64.7	1.07	0.94
330	2110	35.2	2220	37.0	2480	41.3	2820	47.0	3210	53.5	3660	61.0	1.05	0.95
360	2330	38.3	2400	40.0	2620	43.7	2890	48.2	3220	53.7	3590	59.8	1.04	0.97
390	2550	42.5	2630	43.8	2830	47.2	3060	51.0	3320	55.3	3640	60.7	1.02	0.98
420	2880	48.0	2940	49.0	3100	51.7	3290	54.8	3520	58.7	3790	63.2	1.01	1.00
450	3280	54.7	3330	55.5	3450	57.5	3610	60.2	3810	63.5	4040	67.3	1.00	1.01
480	3740	62.3	3780	63.0	3880	64.7	4030	67.2	4200	70.0	4390	73.2	0.98	1.02
510	4310	71.8	4350	72.5	4440	74.0	4550	75.8	4700	78.3	4870	81.2	0.97	1.05
540	6450	85.2	5140	85.7	5220	87.0	5320	88.7	5460	91.0	5630	93.8	0.94	1.23
570	7590	126.5	7610	126.8	7680	128.0	7790	129.8	7960	132.7			0.77	1.50
MAX ENDURANCE														
KTAS	259		276		299		318		343		363		1.04	0.96
FUEL FLOW	1870		2050		2420		2810		3210		3590		1.05	0.94
MAX RANGE														
KTAS	331		366		377		400		429		436		1.04	0.96
FUEL FLOW	2110		2440		2730		3130		3590		3910		1.05	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY

—VMIN LESS THAN 180 KTAS

DRAG INDEX = 150

KTAS	18,000 LB LB/HR	18,000 LB LB/MIN	20,000 LB LB/HR	20,000 LB LB/MIN	24,000 LB LB/HR	24,000 LB LB/MIN	28,000 LB LB/HR	28,000 LB LB/MIN	32,000 LB LB/HR	32,000 LB LB/MIN	36,000 LB LB/HR	36,000 LB LB/MIN	+20°C	–20°C
MIL					5150		5240		5360		5480		0.99	0.94
VMIN	—		—		187		208		233		258		1.06	0.96
210	2140	35.7	2520	42.0	3470	57.8	5060	84.3					1.18	0.84
240	1980	33.0	2210	36.8	2810	46.8	3660	61.0	4920	82.0			1.13	0.88
270	1980	33.0	2160	36.0	2590	43.2	3110	51.8	3800	63.3	4890	81.5	1.10	0.92
300	2080	34.7	2220	37.0	2560	42.7	2970	49.5	3450	57.5	4030	67.2	1.06	0.94
330	2280	38.0	2390	39.8	2660	44.3	2990	49.8	3390	56.5	3840	64.0	1.05	0.96
360	2520	42.0	2620	43.7	2840	47.3	3110	51.8	3440	57.3	3810	63.5	1.03	0.97
390	2830	47.2	2910	48.5	3100	51.7	3330	55.5	3600	60.0	3910	65.2	1.02	1.00
420	3210	53.5	3270	54.5	3430	57.2	3620	60.3	3860	64.3	4120	68.7	1.01	1.01
450	3680	61.3	3730	62.2	3850	64.2	4020	67.0	4220	70.3	4450	74.2	0.99	1.02
480	4240	70.7	4280	71.3	4350	73.0	4500	75.3	4690	78.2	4890	81.5	0.98	1.03
510	4910	81.8	4940	82.3	5040	84.0	5150	85.8	5310	88.5	5490	91.5	0.97	1.06
540	5910	98.5	5940	99.0	6020	100.3	6120	102.0	6250	104.2	6440	107.3	0.93	1.28
MAX ENDURANCE														
KTAS	254		269		291		310		329		352		1.04	0.96
FUEL FLOW	1960		2160		2550		2960		3390		3800		1.05	0.94
MAX RANGE														
KTAS	318		334		368		389		409		430		1.04	0.96
FUEL FLOW	2190		2420		2900		3320		3750		4220		1.05	0.94

Figure A4-6. (Sheet 18)

Subsonic Cruise — 20,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:

- STANDARD DAY TEMPERATURE (–25°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 200

KTAS	TOTAL FUEL FLOW — GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	-20°C
MIL					5150		5250		5370		5500		0.98	0.94
VMIN	—		—		187		209		235		261		1.07	0.96
210	2200	36.7	2580	43.0	3550	59.2	5180	86.3					1.27	0.82
240	2060	34.3	2290	38.2	2900	48.3	3760	62.7	5050	84.2			1.20	0.86
270	2090	34.8	2260	37.7	2690	44.8	3220	53.7	3920	65.3	5040	84.0	1.15	0.90
300	2220	37.0	2360	39.3	2690	44.8	3110	51.8	3590	59.8	4180	69.7	1.07	0.94
330	2450	40.8	2560	42.7	2830	47.2	3170	52.8	3560	59.3	4020	67.0	1.05	0.96
360	2740	45.7	2840	47.3	3060	51.0	3330	55.5	3660	61.0	4030	67.2	1.04	0.97
390	3100	51.7	3180	53.0	3370	56.2	3600	60.0	3870	64.5	4190	69.8	1.02	0.98
420	3550	59.2	3610	60.2	3770	62.8	3960	66.0	4190	69.8	4470	74.5	1.01	1.00
450	4100	68.3	4140	69.0	4270	71.2	4430	73.8	4640	77.3	4880	81.3	0.99	1.02
480	4740	79.0	4780	79.7	4880	81.3	5030	83.8	5210	86.8	5420	90.3	0.98	1.03
510	5540	92.3	5580	93.0	5670	94.5	5780	96.3	5950	99.2	6140	102.3	0.96	1.07
540	6770	112.8	6800	113.3	6880	114.7	7000	116.7	7150	119.2	7370	122.8	0.93	1.22
MAX ENDURANCE														
KTAS	248		261		285		304		321		343		1.04	0.96
FUEL FLOW	2050		2260		2670		3110		3550		4010		1.05	0.94
MAX RANGE														
KTAS	308		322		358		375		399		414		1.04	0.96
FUEL FLOW	2270		2501		3040		3460		3950		4410		1.05	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY

—VMIN LESS THAN 180 KTAS

DRAG INDEX = 250

KTAS	18,000 LB/HR	LB/MIN	20,000 LB/HR	LB/MIN	24,000 LB/HR	LB/MIN	28,000 LB/HR	LB/MIN	32,000 LB/HR	LB/MIN	36,000 LB/HR	LB/MIN	+20°C	-20°C
MIL					5150		5250		5370		5520		0.98	0.94
VMIN	—		—		188		211		237		264		1.07	0.96
210	2260	37.7	2650	44.2	3630	60.5							1.21	0.84
240	2130	35.5	2370	39.5	2980	49.7	3860	64.3	5190	86.5			1.17	0.86
270	2190	36.5	2370	39.5	2800	46.7	3330	55.5	4050	67.5	5200	86.7	1.13	0.90
300	2360	39.3	2490	41.5	2830	47.2	3250	54.2	3730	62.2	4340	72.3	1.07	0.94
330	2630	43.8	2740	45.7	3010	50.2	3350	55.8	3730	62.2	4200	70.0	1.05	0.96
360	2970	49.5	3060	51.0	3290	54.8	3560	59.3	3880	64.7	4260	71.0	1.03	0.97
390	3380	56.3	3460	57.7	3650	60.8	3880	64.7	4150	69.2	4470	74.5	1.01	0.99
420	3890	64.8	3950	65.8	4110	68.5	4300	71.7	4540	75.7	4820	80.3	1.00	1.01
450	4520	75.3	4560	76.0	4690	78.2	4860	81.0	5070	84.5	5320	88.7	0.99	1.02
480	5260	87.7	5310	88.5	5410	90.2	5560	92.7	5740	95.7	5980	99.7	0.98	1.04
510	6200	103.3	6240	104.0	6340	105.7	6470	107.8	6660	111.0	6890	114.8	0.96	1.09
MAX ENDURANCE														
KTAS	242		254		278		297		315		333		1.04	0.96
FUEL FLOW	2130		2350		2790		3250		3710		4200		1.05	0.94
MAX RANGE														
KTAS	306		313		345		368		387		402		1.04	0.96
FUEL FLOW	2400		2590		3140		3630		4110		4590		1.05	0.94

Figure A4-6. (Sheet 19)

Subsonic Cruise — 25,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (−35°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 0

KTAS	TOTAL FUEL FLOW GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	−20°C
MIL			4160		4260		4374		4500		4620		1.02	0.94
VMIN	—		185		209		238		266		292		1.05	0.96
210	2170	36.2	2640	44.0	4150	69.2							1.19	0.83
240	1790	29.8	2090	34.8	2910	48.5	4230	70.5					1.15	0.86
270	1660	27.7	1870	31.2	2370	39.5	3100	51.7	4300	71.7			1.12	0.90
300	1610	26.8	1780	29.7	2180	36.3	2650	44.2	3240	54.0	4230	70.5	1.09	0.92
330	1630	27.2	1770	29.5	2090	34.8	2490	41.5	2950	49.2	3490	58.2	1.07	0.94
360	1700	28.3	1810	30.2	2070	34.5	2400	40.0	2790	46.5	3230	53.8	1.06	0.95
390	1810	30.2	1900	31.7	2120	35.3	2390	39.8	2720	45.3	3100	51.7	1.04	0.97
420	1960	32.7	2030	33.8	2220	37.0	2440	40.7	2720	45.3	3050	50.8	1.03	0.98
450	2160	36.0	2220	37.0	2370	39.5	2570	42.8	2800	46.7	3080	51.3	1.01	1.00
480	2400	40.0	2450	40.8	2580	43.0	2750	45.8	2940	49.0	3180	53.0	1.00	1.02
510	2720	45.3	2770	46.2	2890	48.2	3030	50.5	3190	53.2	3390	56.5	0.98	1.06
540	3200	53.3	3240	54.0	3350	55.8	3490	58.2	3650	60.8	3850	64.2	0.95	1.28
570	4890	81.5	4930	82.2	5050	84.2	5190	86.5	5380	89.7	5600	93.3	0.75	1.45
MAX ENDURANCE														
KTAS	301		318		355		380		404		422		1.04	0.96
FUEL FLOW	1610		1760		2070		2390		2710		3050		1.06	0.94
MAX RANGE														
KTAS	396		420		436		457		481		487		1.04	0.96
FUEL FLOW	1840		2030		2290		2600		2950		3220		1.06	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY
—VMIN LESS THAN 180 KTAS

DRAG INDEX = 50

KTAS	18,000 LB/HR	LB/MIN	20,000 LB/HR	LB/MIN	24,000 LB/HR	LB/MIN	28,000 LB/HR	LB/MIN	32,000 LB/HR	LB/MIN	36,000 LB/HR	LB/MIN	+20°C	−20°C
MIL			4160		4260		4380		4510		4630		1.02	0.95
VMIN	—		185		210		240		269		295		1.05	0.96
210	2230	37.2	2700	45.0	4260	71.0							1.19	0.83
240	1850	30.8	2160	36.0	2990	49.8	4350	72.5					1.15	0.87
270	1740	29.0	1960	32.7	2470	41.2	3200	53.3	4440	74.0			1.11	0.91
300	1720	28.7	1890	31.5	2290	38.2	2770	46.2	3380	56.3	4390	73.2	1.08	0.93
330	1770	29.5	1910	31.8	2240	37.3	2640	44.0	3100	51.7	3660	61.0	1.06	0.94
360	1880	31.3	1990	33.2	2250	37.5	2580	43.0	2970	49.5	3420	57.0	1.05	0.96
390	2020	33.7	2120	35.3	2340	39.0	2610	43.5	2950	49.2	3320	55.3	1.03	0.97
420	2220	37.0	2300	38.3	2490	41.5	2720	45.3	3000	50.0	3320	55.3	1.02	0.99
450	2470	41.2	2540	42.3	2700	45.0	2900	48.3	3140	52.3	3420	57.0	1.00	1.00
480	2790	46.5	2840	47.3	2980	49.7	3140	52.3	3350	55.8	3590	59.8	0.99	1.02
510	3190	53.2	3240	54.0	3350	55.8	3500	58.3	3680	61.3	3890	64.8	0.97	1.07
540	3840	64.0	3890	64.8	3990	66.5	4130	68.8	4300	71.7	4500	75.0	0.93	1.35
570	6220	103.7	6280	104.7	6400	106.7	6580	109.7	6810	113.5	7090	118.2	0.72	1.57
MAX ENDURANCE														
KTAS	294		305		339		362		388		405		1.04	0.96
FUEL FLOW	1720		1880		2230		2580		2940		3310		1.05	0.94
MAX RANGE														
KTAS	381		394		421		444		465		481		1.04	0.96
FUEL FLOW	1980		2140		2490		2860		3240		3600		1.05	0.94

Figure A4-6. (Sheet 20)

Subsonic Cruise — 25,000 Feet

DATA BASIS: FLIGHT TEST **CONDITIONS:** **ENGINE: F100-PW-200**

- **STANDARD DAY TEMPERATURE (–35°C)**

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

		TOTAL FUEL FLOW													
	KTAS	GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
		LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	-20°C
DRAG INDEX = 100	MIL			4160		4270		4390		4520		4650		1.02	0.95
	VMIN	—		186		212		241		271		298		1.05	0.96
	210	2290	38.2	2770	46.2									1.29	0.79
	240	1920	32.0	2230	37.2	3070	51.2							1.22	0.83
	270	1830	30.5	2040	34.0	2560	42.7	3310	55.2					1.16	0.87
	300	1830	30.5	2000	33.3	2410	40.2	2890	48.2	3510	58.5	4560	76.0	1.09	0.92
	330	1920	32.0	2050	34.2	2380	39.7	2780	46.3	3250	54.2	3840	64.0	1.07	0.94
	360	2050	34.2	2160	36.0	2430	40.5	2760	46.0	3150	52.5	3610	60.2	1.06	0.95
	390	2240	37.3	2340	39.0	2560	42.7	2840	47.3	3170	52.8	3550	59.2	1.04	0.97
	420	2490	41.5	2570	42.8	2760	46.0	3000	50.0	3280	54.7	3600	60.0	1.02	0.99
	450	2810	46.8	2870	47.8	3040	50.7	3240	54.0	3480	58.0	3760	62.7	1.01	1.00
	480	3190	53.2	3240	54.0	3380	56.3	3550	59.2	3760	62.7	4010	66.8	0.99	1.03
	510	3680	61.3	3730	62.2	3840	64.0	3990	66.5	4170	69.5	4390	73.2	0.97	1.08
	540	4520	75.3	4560	76.0	4660	77.7	4800	80.0	4990	83.2	5210	86.8	0.92	1.43
	MAX ENDURANCE														
	KTAS	283		299		323		349		366		389		1.04	0.96
	FUEL FLOW	1820		2000		2380		2760		3150		3550		1.05	0.94
	MAX RANGE														
	KTAS	361		377		404		422		451		465		1.04	0.96
	FUEL FLOW	2060		2260		2650		3010		3480		3880		1.05	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY
—VMIN LESS THAN 180 KTAS

	KTAS	18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	+20°C	-20°C
DRAG INDEX = 150	MIL			4170		4270		4400		4540		4660		1.02	0.95
	VMIN	—		187		213		243		274		302		0.93	0.96
	210	2350	39.2	2830	47.2									1.27	0.80
	240	1990	33.2	2300	38.3	3160	52.7							1.20	0.84
	270	1910	31.8	2130	35.5	2650	44.2	3420	57.0					1.15	0.87
	300	1940	32.3	2110	35.2	2520	42.0	3000	50.0	3660	61.0			1.09	0.93
	330	2060	34.3	2200	36.7	2530	42.2	2930	48.8	3400	56.7	4020	67.0	1.06	0.94
	360	2230	37.2	2340	39.0	2610	43.5	2950	49.2	3330	55.5	3810	63.5	1.05	0.96
	390	2470	41.2	2560	42.7	2790	46.5	3070	51.2	3400	56.7	3790	63.2	1.03	0.98
	420	2770	46.2	2850	47.5	3040	50.7	3280	54.7	3560	59.3	3900	65.0	1.02	0.99
	450	3150	52.5	3210	53.5	3380	56.3	3580	59.7	3830	63.8	4120	68.7	1.00	1.01
	480	3600	60.0	3650	60.8	3790	63.2	3970	66.2	4190	69.8	4460	74.3	0.99	1.03
	510	4190	69.8	4230	70.5	4350	72.5	4510	75.2	4700	78.3	4930	82.2	0.97	1.09
	540	5260	87.7	5290	88.2	5390	89.8	5550	92.5	5780	96.3	6040	100.7	0.90	1.40
	MAX ENDURANCE														
	KTAS	277		290		313		338		361		377		1.04	0.96
	FUEL FLOW	1910		2110		2510		2920		3330		3780		1.05	0.94
	MAX RANGE														
	KTAS	353		362		391		417		427		451		1.04	0.96
	FUEL FLOW	2190		2360		2800		3260		3620		4130		1.05	0.94

Figure A4-6. (Sheet 21)

Subsonic Cruise — 25,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (–35°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 200

KTAS	GROSS WEIGHT 18,000 LB LB/HR	18,000 LB LB/MIN	20,000 LB LB/HR	20,000 LB LB/MIN	24,000 LB LB/HR	24,000 LB LB/MIN	28,000 LB LB/HR	28,000 LB LB/MIN	32,000 LB LB/HR	32,000 LB LB/MIN	36,000 LB LB/HR	36,000 LB LB/MIN	TEMP* EFFECT FACTOR +20°C	TEMP* EFFECT FACTOR -20°C
	TOTAL FUEL FLOW													
MIL			4170		4280		4410		4550		4690		1.01	0.94
VMIN	—		187		215		245		276		306		1.06	0.96
210	2410	40.2	2900	48.3									1.31	0.76
240	2060	34.3	2370	39.5	3240	54.0							1.23	0.81
270	2000	33.3	2220	37.0	2740	45.7	3540	59.0					1.18	0.85
300	2050	34.2	2220	37.0	2630	43.8	3120	52.0	3800	63.3			1.14	0.91
330	2210	36.8	2340	39.0	2670	44.5	3070	51.2	3560	59.3	4200	70.0	1.08	0.93
360	2420	40.3	2530	42.2	2800	46.7	3130	52.2	3530	58.8	4030	67.2	1.05	0.95
390	2700	45.0	2800	46.7	3020	50.3	3300	55.0	3640	60.7	4050	67.5	1.04	0.97
420	3060	51.0	3140	52.3	3320	55.3	3560	59.3	3850	64.2	4210	70.2	1.02	0.99
450	3490	58.2	3560	59.3	3720	62.0	3930	65.5	4190	69.8	4510	75.2	1.00	1.01
480	4030	67.2	4080	68.0	4220	70.3	4410	73.5	4640	77.3	4950	82.5	0.99	1.03
510	4720	78.7	4770	79.5	4890	81.5	5070	84.5	5290	88.2	5550	92.5	0.96	1.11
540	6140	102.3	6180	103.0	6290	104.8	6450	107.5	6660	111.0			0.94	1.26
MAX ENDURANCE														
KTAS	269		283		305		328		352		370		1.04	0.96
FUEL FLOW	2000		2210		2630		3070		3520		4020		1.05	0.94
MAX RANGE														
KTAS	340		356		378		401		421		437		1.04	0.96
FUEL FLOW	2270		2500		2930		3380		3860		4360		1.05	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY
—VMIN LESS THAN 180 KTAS

DRAG INDEX = 250

KTAS	18,000 LB LB/HR	18,000 LB LB/MIN	20,000 LB LB/HR	20,000 LB LB/MIN	24,000 LB LB/HR	24,000 LB LB/MIN	28,000 LB LB/HR	28,000 LB LB/MIN	32,000 LB LB/HR	32,000 LB LB/MIN	36,000 LB LB/HR	36,000 LB LB/MIN	+20°C	-20°C
MIL			4170		4290		4420		4560		4720		1.01	0.94
VMIN	—		188		217		248		279		310		1.06	0.96
210	2460	41.0	2960	49.3									1.35	0.84
240	2120	35.3	2440	40.7	3340	55.7							1.28	0.86
270	2090	34.8	2300	38.3	2830	47.2	3650	60.8					1.21	0.88
300	2170	36.2	2340	39.0	2750	45.8	3250	54.2	3940	65.7			1.14	0.91
330	2350	39.2	2490	41.5	2820	47.0	3220	53.7	3730	62.2	4380	73.0	1.07	0.94
360	2600	43.3	2720	45.3	2990	49.8	3320	55.3	3720	62.0	4240	70.7	1.05	0.96
390	2930	48.8	3030	50.5	3250	54.2	3530	58.8	3880	64.7	4320	72.0	1.03	0.98
420	3340	55.7	3420	57.0	3610	60.2	3860	64.3	4160	69.3	4550	75.8	1.01	1.00
450	3840	64.0	3910	65.2	4090	68.2	4300	71.7	4590	76.5	4920	82.0	1.00	1.02
480	4470	74.5	4520	75.3	4680	78.0	4890	81.5	5150	85.8	5470	91.2	0.98	1.04
510	5330	88.8	5380	89.7	5510	91.8	5700	95.0	5930	98.8	6200	103.3	0.96	1.06
MAX ENDURANCE														
KTAS	262		276		300		320		342		363		1.04	0.96
FUEL FLOW	2080		2300		2750		3210		3700		4230		1.05	0.94
MAX RANGE														
KTAS	325		344		367		391		410		422		1.04	0.96
FUEL FLOW	2320		2590		3040		3540		4060		4560		1.05	0.94

Figure A4-6. (Sheet 22)

Subsonic Cruise — 30,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (–44°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 0

KTAS	TOTAL FUEL FLOW GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	–20°C
MIL			3370		3490		3640		3780		3940		1.05	0.95
VMIN	—		211		247		280		309		339		1.04	0.95
210	2600	43.3											1.35	0.76
240	1950	32.5	2390	39.8									1.26	0.81
270	1690	28.2	1950	32.5	2700	45.0							1.19	0.85
300	1580	26.3	1790	29.8	2260	37.7	2950	49.2					1.11	0.91
330	1550	25.8	1710	28.5	2120	35.3	2580	43.0	3220	53.7			1.08	0.92
360	1570	26.2	1700	28.3	2030	33.8	2430	40.5	2900	48.3	3520	58.7	1.07	0.93
390	1630	27.2	1740	29.0	2010	33.5	2350	39.2	2750	45.8	3240	54.0	1.06	0.95
420	1740	29.0	1830	30.5	2060	34.3	2340	39.0	2680	44.7	3090	51.5	1.04	0.97
450	1890	31.5	1970	32.8	2160	36.0	2400	40.0	2690	44.8	3030	50.5	1.02	0.98
480	2090	34.8	2150	35.8	2310	38.5	2520	42.0	2770	46.2	3060	51.0	1.01	1.01
510	2370	39.5	2430	40.5	2580	43.0	2760	46.0	2970	49.5	3220	53.7	0.98	1.08
540	2950	49.2	3010	50.2	3160	52.7	3330	55.5	3530	58.8	3780	63.0	0.90	1.40
570	4820	80.3	4890	81.5	5070	84.5	5320	88.7	5620	93.7	5980	99.7	0.72	1.35
MAX ENDURANCE														
KTAS	335		353		383		413		431		455		1.04	0.96
FUEL FLOW	1550		1700		2010		2340		2680		3030		1.06	0.94
MAX RANGE														
KTAS	413		434		466		472		495		501		1.04	0.96
FUEL FLOW	1710		1890		2230		2470		2850		3140		1.06	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY
—VMIN LESS THAN 180 KTAS

DRAG INDEX = 50

KTAS	18,000 LB LB/HR	18,000 LB LB/MIN	20,000 LB LB/HR	20,000 LB LB/MIN	24,000 LB LB/HR	24,000 LB LB/MIN	28,000 LB LB/HR	28,000 LB LB/MIN	32,000 LB LB/HR	32,000 LB LB/MIN	36,000 LB LB/HR	36,000 LB LB/MIN	+20°C	–20°C
MIL	3320		3370		3500		3650		3800		3970		1.05	0.95
VMIN	197		213		249		282		313		344		1.04	0.95
210	2670	44.5											1.32	0.76
240	2010	33.5	2450	40.8									1.24	0.81
270	1760	29.3	2020	33.7	2800	46.7							1.18	0.85
300	1670	27.8	1890	31.5	2360	39.3	3070	51.2					1.11	0.91
330	1670	27.8	1830	30.0	2230	37.2	2710	45.2	3370	56.2			1.08	0.92
360	1710	28.5	1850	30.8	2180	36.3	2580	43.0	3070	51.2	3710	61.8	1.07	0.94
390	1810	30.2	1930	32.2	2200	36.7	2540	42.3	2940	49.0	3460	57.7	1.05	0.96
420	1960	32.7	2050	34.2	2290	38.2	2570	42.8	2920	48.7	3340	55.7	1.03	0.97
450	2150	35.8	2230	37.2	2430	40.5	2680	44.7	2980	49.7	3340	55.7	1.02	0.99
480	2400	40.0	2470	41.2	2650	44.2	2860	47.7	3110	51.8	3420	57.0	1.00	1.02
510	2770	46.2	2840	47.2	2990	49.8	3180	53.0	3390	56.5	3660	61.0	0.97	1.10
540	3600	60.0	3660	61.0	3800	63.3	3990	66.5	4210	70.2	4490	74.8	0.87	1.50
570	6320	105.3	6450	107.5									0.67	1.63
MAX ENDURANCE														
KTAS	319		339		366		391		413		439		1.04	0.96
FUEL FLOW	1660		1830		2180		2540		2920		3330		1.06	0.94
MAX RANGE														
KTAS	408		413		443		471		483		500		1.04	0.96
FUEL FLOW	1890		2020		2390		2790		3130		3530		1.06	0.94

Figure A4-6. (Sheet 23)

Subsonic Cruise — 30,000 Feet

DATA BASIS: FLIGHT TEST **CONDITIONS:** **ENGINE: F100-PW-200**

• STANDARD DAY TEMPERATURE (–44°C)

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 100

KTAS	TOTAL FUEL FLOW GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	-20°C
MIL	3320		3380		3510		3660		3830		4010		1.03	0.94
VMIN	197		215		251		285		317		352		1.05	0.95
210	2730	45.5											1.40	0.77
240	2070	34.5	2520	42.0									1.31	0.81
270	1840	30.7	2100	35.0	2900	48.3							1.23	0.85
300	1770	29.5	1980	33.0	2460	41.0	3190	53.2					1.17	0.88
330	1780	29.7	1960	32.7	2350	39.2	2840	47.3	3520	58.7			1.10	0.92
360	1860	31.0	2000	33.3	2330	38.8	2730	45.5	3250	54.2	3910	65.2	1.07	0.94
390	2000	33.3	2110	35.2	2390	39.8	2730	45.5	3150	52.5	3670	61.2	1.05	0.95
420	2180	36.3	2280	38.0	2520	42.0	2810	46.8	3160	52.7	3610	60.2	1.04	0.97
450	2430	40.5	2510	41.8	2720	45.3	2970	49.5	3270	54.5	3670	61.2	1.02	0.99
480	2750	45.8	2820	47.0	2990	49.8	3200	53.3	3470	57.8	3810	63.5	1.01	1.02
510	3200	53.3	3250	54.2	3410	56.8	3610	60.2	3850	64.2	4150	69.2	0.97	1.12
540	4300	71.7	4360	72.7	4530	75.5	4740	79.0	5000	83.3	5330	88.8	0.84	1.57
MAX ENDURANCE														
KTAS	307		324		352		375		399		420		1.04	0.96
FUEL FLOW	1770		1950		2330		2720		3140		3610		1.06	0.94
MAX RANGE														
KTAS	383		404		425		449		472		485		1.04	0.96
FUEL FLOW	1960		2180		2540		2960		3400		3840		1.06	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY

DRAG INDEX = 150

KTAS	18,000 LB/HR	LB/MIN	20,000 LB/HR	LB/MIN	24,000 LB/HR	LB/MIN	28,000 LB/HR	LB/MIN	32,000 LB/HR	LB/MIN	36,000 LB/HR	LB/MIN	+20°C	-20°C
MIL	3320		3380		3520		3670		3850		4090		1.03	0.95
VMIN	198		216		253		287		322		363		1.06	0.95
210	2800	46.7											1.31	0.78
240	2130	35.5	2600	43.3									1.23	0.81
270	1910	31.8	2170	36.2	2990	49.8							1.16	0.85
300	1870	31.2	2070	34.5	2560	42.7	3310	55.2					1.12	0.88
330	1910	31.8	2080	34.7	2470	41.2	2990	49.8	3680	61.3			1.09	0.92
360	2010	33.5	2150	35.8	2480	41.3	2890	48.2	3430	57.2			1.07	0.94
390	2190	36.5	2300	38.3	2580	43.0	2930	48.8	3360	56.0	3910	65.2	1.04	0.96
420	2420	40.3	2510	41.8	2750	45.8	3050	50.8	3430	57.2	3890	64.8	1.03	0.98
450	2720	45.3	2800	46.7	3000	50.0	3260	54.3	3600	60.0	4010	66.8	1.01	1.00
480	3090	51.5	3160	52.7	3340	55.7	3570	59.5	3870	64.5	4240	70.7	1.00	1.03
510	3630	60.5	3690	61.5	3860	64.3	4080	68.0	4370	72.8	4700	78.3	1.00	1.16
540	5130	85.5	5200	86.7	5380	89.7	5620	93.7					0.85	1.62
MAX ENDURANCE														
KTAS	298		314		342		360		390		420		1.04	0.96
FUEL FLOW	1860		2070		2460		2890		3360		3890		1.06	0.94
MAX RANGE														
KTAS	373		387		413		437		456		479		1.04	0.96
FUEL FLOW	2080		2280		2700		3160		3640		4230		1.06	0.94

Figure A4-6. (Sheet 24)

Subsonic Cruise — 30,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (–44°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 200

KTAS	TOTAL FUEL FLOW — GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	–20°C
MIL	3330		3390		3530		3690		3880		4190		1.03	0.94
VMIN	199		218		256		291		328		379		1.07	0.95
210	2860	47.7											1.34	0.72
240	2190	36.5	2680	44.7									1.26	0.78
270	1980	33.0	2250	37.5	3090	51.5							1.21	0.82
300	1960	32.7	2170	36.2	2660	44.3	3440	57.3					1.14	0.86
330	2030	33.8	2200	36.7	2590	43.2	3130	52.2	3850	64.2			1.10	0.90
360	2170	36.2	2310	38.5	2640	44.0	3060	51.0	3610	60.2			1.08	0.93
390	2380	39.7	2490	41.5	2770	46.2	3130	52.2	3580	59.7	4150	69.2	1.06	0.96
420	2650	44.2	2750	45.8	2990	49.8	3300	55.0	3710	61.8	4180	69.7	1.03	0.97
450	3000	50.0	3090	51.5	3300	55.0	3590	59.8	3940	65.7	4380	73.0	1.02	1.00
480	3440	57.3	3520	58.7	3710	61.8	3980	66.3	4300	71.7	4690	78.2	1.00	1.03
510	4120	68.7	4190	69.8	4380	73.0	4620	77.0	4920	82.0	5300	88.3	0.96	1.12
MAX ENDURANCE														
KTAS	293		304		333		360		380		390		1.04	0.96
FUEL FLOW	1960		2170		2590		3060		3570		4150		1.06	0.94
MAX RANGE														
KTAS	360		379		403		421		443		463		1.04	0.96
FUEL FLOW	2170		2420		2860		3310		3870		4490		1.06	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY

DRAG INDEX = 250

MIL	3330		3390		3540		3700		3940				1.03	0.94
VMIN	200		220		258		295		338				1.08	0.95
210	2930	48.8											1.25	0.83
240	2250	37.5	2760	46.0									1.21	0.85
270	2060	34.3	2330	38.8	3190	53.2							1.17	0.87
300	2060	34.3	2260	37.7	2770	46.2	3570	59.5					1.13	0.89
330	2150	35.8	2320	38.7	2720	45.3	3270	54.5					1.09	0.91
360	2320	38.7	2460	41.0	2800	46.7	3240	54.0	3800	63.3			1.07	0.93
390	2570	42.8	2690	44.8	2970	49.5	3360	56.0	3810	63.5			1.05	0.97
420	2890	48.2	2990	49.8	3250	54.2	3580	59.7	4000	66.7			1.03	0.98
450	3310	55.2	3400	56.7	3630	60.5	3930	65.5	4310	71.8			1.00	1.00
480	3840	64.0	3930	65.5	4140	69.0	4410	73.5	4760	79.3			0.98	1.05
510	4660	77.7	4730	78.8	4940	82.3	5200	86.7					0.96	1.10
MAX ENDURANCE														
KTAS	285		297		324		351		374				1.04	0.96
FUEL FLOW	2040		2260		3290		3830		4380				1.06	0.94
MAX RANGE														
KTAS	353		367		392		413		431				1.04	0.96
FUEL FLOW	2280		2500		2980		3510		4100				1.06	0.94

Figure A4-6. (Sheet 25)

Subsonic Cruise — 35,000 Feet

DATA BASIS: FLIGHT TEST **CONDITIONS:** **ENGINE:** F100-PW-200

• STANDARD DAY TEMPERATURE (−54°C)

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 0

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	−20°C
MIL	2670		2740		2890		3050		3240		3500		1.05	0.94
VMIN	231		252		291		328		367		410		1.04	0.95
—														
240	2380	39.7											1.31	0.75
270	1810	30.2	2250	37.5									1.24	0.80
300	1630	27.2	1870	31.2	2640	44.0							1.16	0.84
330	1540	25.7	1740	29.0	2220	37.0	2980	49.7					1.13	0.90
360	1500	25.0	1670	27.8	2070	34.5	2590	43.2					1.10	0.91
390	1520	25.3	1660	27.7	2000	33.3	2420	40.3	2990	49.8			1.08	0.93
420	1580	26.3	1690	28.2	1980	33.0	2340	39.0	2800	46.7	3410	56.8	1.06	0.95
450	1680	28.0	1770	29.5	2020	33.7	2330	38.8	2710	45.2	3200	53.3	1.04	0.97
480	1830	30.5	1920	32.0	2120	35.3	2380	39.7	2700	45.0	3110	51.8	1.02	1.01
510	2090	34.8	2170	36.2	2360	39.3	2590	43.2	2860	47.7	3210	53.5	0.97	1.16
540	2910	48.5	2990	49.8	3180	53.0	3430	57.2	3770	62.8	4190	69.8	0.81	1.46
570	4820	80.3	4940	82.3	5250	87.5							0.72	1.31
MAX ENDURANCE														
KTAS	369		383		409		441		467		489		1.04	0.95
FUEL FLOW	1500		1660		1980		2330		2690		3090		1.06	0.94
MAX RANGE														
KTAS	444		461		479		490		490		504		1.04	0.95
FUEL FLOW	1650		1810		2120		2420		2710		3160		1.06	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY

DRAG INDEX = 50

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	−20°C
MIL	2680		2750		2900		3070		3300		3620		1.05	0.94
VMIN	233		255		294		332		377		427		1.05	0.95
—														
240	2450	40.8											1.22	0.77
270	1870	31.2	2330	38.8									1.18	0.81
300	1710	28.5	1950	32.5	2740	45.7							1.15	0.85
330	1640	27.3	1840	30.7	2340	39.0							1.12	0.90
360	1630	27.2	1800	30.0	2200	36.7	2750	45.8					1.09	0.92
390	1670	27.8	1810	30.2	2150	35.8	2590	43.2	3180	53.0			1.07	0.94
420	1760	29.3	1880	31.3	2170	36.2	2550	42.5	3020	50.3			1.05	0.96
450	1900	31.7	2010	33.5	2260	37.7	2570	42.8	2990	49.8	3500	58.3	1.03	0.98
480	2110	35.2	2190	36.5	2410	40.2	2670	44.5	3020	50.3	3470	57.8	1.01	1.02
510	2450	40.8	2530	42.2	2720	45.3	2970	49.5	3270	54.5	3690	61.5	0.96	1.22
540	3600	60.0	3690	61.5	3930	65.5	4220	70.3	4640	77.3			0.76	1.64
MAX ENDURANCE														
KTAS	350		369		400		419		456		477		1.04	0.95
FUEL FLOW	1620		1790		2150		2550		2990		3470		1.06	0.94
MAX RANGE														
KTAS	427		442		461		485		490		490		1.04	0.95
FUEL FLOW	1790		1970		2300		2700		3060		3490		1.06	0.94

Figure A4-6. (Sheet 26)

Subsonic Cruise — 35,000 Feet

DATA BASIS: FLIGHT TEST **CONDITIONS:** **ENGINE:** F100-PW-200

- STANDARD DAY TEMPERATURE (–54°C)

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 100

KTAS	TOTAL FUEL FLOW GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	-20°C
MIL	2680		2760		2920		3100		3380		3830		1.05	0.94
VMIN	235		257		298		339		391		455		1.05	0.95
—														
240	2520	42.0											1.38	0.78
270	1940	32.3	2410	40.2									1.28	0.82
300	1780	29.7	2040	34.0	2850	47.5							1.20	0.86
330	1740	29.0	1940	32.3	2460	41.0							1.14	0.89
360	1750	29.2	1920	32.0	2330	38.8	2900	48.3					1.11	0.91
390	1820	30.3	1970	32.8	2320	38.7	2770	46.2					1.08	0.93
420	1950	32.5	2080	34.7	2370	39.5	2770	46.2	3260	54.3			1.06	0.95
450	2140	35.7	2240	37.3	2500	41.7	2840	47.3	3280	54.7			1.04	0.97
480	2390	39.8	2480	41.3	2700	45.0	2990	49.8	3380	56.3	3870	64.5	1.02	1.03
510	2810	46.8	2900	48.3	3110	51.8	3400	56.7	3750	62.5	4230	70.5	0.95	1.27
540	4440	74.0	4540	75.7	4800	80.0							0.72	1.70
MAX ENDURANCE														
KTAS	342		350		378		404		428		455		1.04	0.95
FUEL FLOW	1730		1920		2310		2760		3260		3830		1.06	0.94
MAX RANGE														
KTAS	406		426		457		473		489		490		1.04	0.95
FUEL FLOW	1880		2110		2540		2940		3440		3920		1.06	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY

DRAG INDEX = 150

KTAS	18,000 LB/HR	LB/MIN	20,000 LB/HR	LB/MIN	24,000 LB/HR	LB/MIN	28,000 LB/HR	LB/MIN	32,000 LB/HR	LB/MIN	36,000 LB/HR	LB/MIN	+20°C	-20°C
MIL	2690		2770		2930		3140		3510				1.06	0.94
VMIN	237		260		301		349		410				1.05	0.95
—														
240	2590	43.2											1.28	0.79
270	2010	33.5	2490	41.5									1.22	0.82
300	1860	31.0	2120	35.3									1.18	0.86
330	1840	30.7	2040	34.0	2580	43.0							1.14	0.88
360	1870	31.2	2050	34.2	2470	41.2	3060	51.0					1.11	0.91
390	1980	33.0	2120	35.3	2490	41.5	2950	49.2					1.08	0.94
420	2150	35.8	2270	37.8	2580	43.0	3000	50.0	3510	58.5			1.05	0.96
450	2370	39.5	2480	41.3	2760	46.0	3130	52.2	3590	59.8			1.03	0.98
480	2680	44.7	2780	46.3	3020	50.3	3350	55.8	3760	62.7			1.01	1.04
510	3210	53.5	3320	55.3	3560	59.3	3880	64.7	4270	71.2			0.94	1.19
MAX ENDURANCE														
KTAS	327		345		372		397		412				1.04	0.95
FUEL FLOW	1830		2030		2460		2950		3500				1.06	0.94
MAX RANGE														
KTAS	403		409		436		464		473				1.04	0.95
FUEL FLOW	2040		2210		2660		3210		3700				1.06	0.94

Figure A4-6. (Sheet 27)

Subsonic Cruise — 35,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (−54°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 200

KTAS	TOTAL FUEL FLOW — GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	−20°C
MIL	2700		2780		2950		3210						1.05	0.94
VMIN	239		262		306		362						1.08	0.95
—														
240	2660	44.3											1.37	0.75
270	2080	34.7	2580	43.0									1.29	0.79
300	1940	32.3	2210	36.8									1.24	0.81
330	1940	32.3	2150	35.8	2700	45.0							1.17	0.87
360	2000	33.3	2180	36.3	2620	43.7							1.12	0.91
390	2140	35.7	2290	38.2	2670	44.5	3140	52.3					1.07	0.95
420	2340	39.0	2470	41.2	2810	46.8	3240	54.0					1.03	0.97
450	2620	43.7	2740	45.7	3040	50.7	3430	57.2					1.02	0.99
480	3000	50.0	3110	51.8	3370	56.2	3730	62.2					1.00	1.05
510	3670	61.2	3790	63.2	4050	67.5							0.92	1.13
MAX ENDURANCE														
KTAS	318		336		363		385						1.04	0.95
FUEL FLOW	1930		2140		3110		3640						1.06	0.94
MAX RANGE														
KTAS	385		403		425		447						1.04	0.95
FUEL FLOW	2110		2360		2840		3405						1.06	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY

DRAG INDEX = 250

KTAS	18,000 LB/HR	LB/MIN	20,000 LB/HR	LB/MIN	24,000 LB/HR	LB/MIN	28,000 LB/HR	LB/MIN	32,000 LB/HR	LB/MIN	36,000 LB/HR	LB/MIN	+20°C	−20°C
MIL	2710		2790		2970		3340						1.05	0.94
VMIN	241		265		311		384						1.08	0.95
—														
—														
270	2150	35.8	2660	44.3									1.24	0.79
300	2020	33.7	2310	38.5									1.20	0.80
330	2040	34.0	2250	37.5	2830	47.2							1.16	0.82
360	2130	35.5	2310	38.5	2770	46.2							1.12	0.84
390	2300	38.3	2460	41.0	2860	47.7	3340	55.7					1.09	0.86
420	2550	42.5	2690	44.8	3040	50.7	3500	58.3					1.05	0.88
450	2900	48.3	3020	50.3	3340	55.7	3750	62.5					1.00	0.90
480	3350	55.8	3460	57.7	3750	62.5							0.98	0.94
510	4180	69.7											0.96	0.95
MAX ENDURANCE														
KTAS	309		329		357		384						1.04	0.95
FUEL FLOW	2020		2250		2770		3340						1.06	0.94
MAX RANGE														
KTAS	375		393		411		433						1.04	0.95
FUEL FLOW	2200		2470		2980		3590						1.06	0.94

Figure A4-6. (Sheet 28)

Subsonic Cruise — 40,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:

• STANDARD DAY TEMPERATURE (–56°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 0

KTAS	GROSS WEIGHT 18,000 LB LB/HR	18,000 LB LB/MIN	20,000 LB LB/HR	20,000 LB LB/MIN	24,000 LB LB/HR	24,000 LB LB/MIN	28,000 LB LB/HR	28,000 LB LB/MIN	32,000 LB LB/HR	32,000 LB LB/MIN	36,000 LB LB/HR	36,000 LB LB/MIN	TEMP* EFFECT FACTOR +20°C	TEMP* EFFECT FACTOR -20°C
	TOTAL FUEL FLOW													
MIL	2220		2300		2480		2740		3055				1.04	0.94
VMIN	281		305		352		404		458				1.06	0.95
—														
—														
—														
300	1860	31.0											1.20	0.83
330	1650	27.5	1950	32.5									1.17	0.86
360	1560	26.0	1780	29.7	2400	40.0							1.12	0.88
390	1510	25.2	1700	28.3	2190	36.5							1.11	0.90
420	1510	25.2	1670	27.8	2070	34.5	2630	43.8					1.09	0.92
450	1550	25.8	1690	28.2	2030	33.8	2490	41.5					1.07	0.94
480	1650	27.5	1760	29.3	2040	34.0	2420	40.3	2960	49.3			1.05	0.99
510	1850	30.8	1960	32.7	2200	36.7	2530	42.2	2990	49.8			1.00	1.18
540	2600	43.3	2710	45.2	3020	50.3	3450	57.5					0.80	1.45
MAX ENDURANCE														
KTAS	403		424		459		480		495				1.05	0.95
FUEL FLOW	1510		1670		2020		2420		2940				1.06	0.94
MAX RANGE														
KTAS	464		484		488		502		509				1.05	0.95
FUEL FLOW	1590		1780		2060		2470		2980				1.06	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY

DRAG INDEX = 50

KTAS	18,000 LB LB/HR	18,000 LB LB/MIN	20,000 LB LB/HR	20,000 LB LB/MIN	24,000 LB LB/HR	24,000 LB LB/MIN	28,000 LB LB/HR	28,000 LB LB/MIN	32,000 LB LB/HR	32,000 LB LB/MIN	36,000 LB LB/HR	36,000 LB LB/MIN	+20°C	-20°C
MIL	2220		2310		2520		2830						1.04	0.94
VMIN	284		309		362		420						1.06	0.95
—														
—														
—														
300	1940	32.3											1.18	0.80
330	1740	29.0	2040	34.0									1.15	0.83
360	1660	27.7	1890	31.5									1.12	0.87
390	1640	27.3	1830	30.5	2340	39.0							1.10	0.91
420	1660	27.7	1830	30.5	2250	37.5	2830	47.2					1.08	0.93
450	1740	29.0	1880	31.3	2240	37.3	2730	45.5					1.06	0.95
480	1870	31.2	1990	33.2	2290	38.2	2710	45.2					1.06	1.00
510	2150	35.8	2260	37.7	2530	42.2	2920	48.7					0.97	1.26
540	3220	53.7	3360	56.0	3730	62.2							0.75	1.78
MAX ENDURANCE														
KTAS	391		403		442		472						1.05	0.95
FUEL FLOW	1640		1820		2240		2710						1.06	0.94
MAX RANGE														
KTAS	459		470		489		489						1.05	0.95
FUEL FLOW	1770		1950		2320		2730						1.06	0.94

Figure A4-6. (Sheet 29)

Subsonic Cruise — 40,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:
- STANDARD DAY TEMPERATURE (–56°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 100

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
	TOTAL FUEL FLOW													
MIL	2230		2330		2570		2980						1.05	0.94
VMIN	287		313		372		446						1.05	0.94
—														
—														
—														
300	2020	33.7											1.23	0.83
330	1830	30.5	2150	35.8									1.13	0.86
360	1760	29.3	2010	33.5									1.11	0.90
390	1760	29.3	1960	32.7	2490	41.5							1.09	0.91
420	1820	30.3	1990	33.2	2430	40.5							1.07	0.93
450	1930	32.2	2080	34.7	2470	41.2	2980	49.7					1.05	0.94
480	2100	35.0	2230	37.2	2570	42.8	3030	50.5					1.03	1.00
510	2460	41.0	2580	43.0	2910	48.5	3350	55.8					0.96	1.42
	MAX ENDURANCE													
KTAS	373		391		424		448						1.05	0.95
FUEL FLOW	1750		1960		2430		2980						1.06	0.94
	MAX RANGE													
KTAS	446		459		487		488						1.05	0.95
FUEL FLOW	1920		2120		2610		3060						1.06	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY

DRAG INDEX = 150

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	-20°C
MIL	2250		2350		2660								1.09	0.95
VMIN	291		318		388								1.06	0.95
—														
—														
—														
300	2100	35.0											1.27	0.84
330	1920	32.0	2250	37.5									1.21	0.86
360	1870	31.2	2120	35.3									1.17	0.89
390	1900	31.7	2110	35.2	2650	44.2							1.13	0.92
420	1980	33.0	2170	36.2	2620	43.7							1.09	0.94
450	2130	35.5	2300	38.3	2710	45.2							1.05	0.99
480	2350	39.2	2500	41.7	2870	47.8							1.01	1.05
510	2820	47.0	2960	49.3	3320	55.3							0.91	1.22
	MAX ENDURANCE													
KTAS	363		378		403								1.05	0.95
FUEL FLOW	1870		2100		2610								1.06	0.94
	MAX RANGE													
KTAS	430		448		470								1.05	0.95
FUEL FLOW	2020		2290		2801								1.06	0.94

Figure A4-6. (Sheet 30)

Subsonic Cruise — 40,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:

• STANDARD DAY TEMPERATURE (–56°C)

ENGINE: F100-PW-200

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 200

KTAS	GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	-20°C
MIL	2260		2380		2820								1.05	0.95
VMIN	295		326		418								1.05	0.95
—														
—														
—														
300	2180	36.3											1.12	0.89
330	2010	33.5	2350	39.2									1.09	0.93
360	1980	33.0	2240	37.3									1.07	0.95
390	2040	34.0	2260	37.7									1.04	0.97
420	2160	36.0	2350	39.2	2830	47.2							1.02	0.99
450	2360	39.3	2530	42.2	2970	49.5							1.00	1.01
480	2640	44.0	2790	46.5									0.98	1.08
510	3220	53.7	3380	56.3									0.90	1.20
MAX ENDURANCE														
KTAS	355		372		418								1.05	0.95
FUEL FLOW	1980		2230		2820								1.06	0.94
MAX RANGE														
KTAS	422		431		463								1.05	0.95
FUEL FLOW	2160		2400		3047								1.06	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY

DRAG INDEX = 250

KTAS	GROSS WEIGHT 18,000 LB		20,000 LB		24,000 LB		28,000 LB		32,000 LB		36,000 LB		TEMP* EFFECT FACTOR	
	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	LB/HR	LB/MIN	+20°C	-20°C
MIL	2280		2420										1.05	0.89
VMIN	299		337										1.05	0.95
—														
—														
—														
300	2260	37.7											1.15	0.63
330	2110	35.2											1.09	0.70
360	2100	35.0	2370	39.5									1.06	0.85
390	2190	36.5	2410	40.2									1.03	0.98
420	2350	39.2	2550	42.5									1.01	1.00
450	2590	43.2	2770	46.2									0.99	1.02
480	2930	48.8	3110	51.8									0.97	1.04
MAX ENDURANCE														
KTAS	347		365										1.05	0.95
FUEL FLOW	2090		2360										1.06	0.94
MAX RANGE														
KTAS	407		424										1.05	0.95
FUEL FLOW	2270		2570										1.06	0.94

Figure A4-6. (Sheet 31)

Subsonic Cruise — 45,000 Feet

DATA BASIS: FLIGHT TEST

CONDITIONS:

ENGINE: F100-PW-200

- STANDARD DAY TEMPERATURE (−56°C)

NOTE: REFER TO SECTION V FOR AIRSPEED LIMITATIONS.

DRAG INDEX = 0

KTAS	TOTAL FUEL FLOW GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	−20°C
MIL	1900		2030		2327								1.04	0.94
VMIN	342		376		445								1.06	0.95
—														
—														
—														
—														
—														
360	1770	29.5											1.16	0.85
390	1640	27.3	1940	32.3									1.13	0.87
420	1570	26.2	1820	30.3									1.10	0.89
450	1550	25.8	1750	29.2	2290	38.2							1.09	0.91
480	1580	26.3	1740	29.0	2210	36.8							1.06	0.94
510	1720	28.7	1860	31.0	2260	37.7							1.00	1.16
540	2350	39.2	2540	42.3									0.80	1.31
MAX ENDURANCE														
KTAS	453		467		486								1.05	0.95
FUEL FLOW	1550		1740		2190								1.06	0.94
MAX RANGE														
KTAS	489		488		502								1.05	0.95
FUEL FLOW	1590		1760		2210								1.06	0.94

*TEMPERATURE DEVIATION FROM STANDARD DAY

DRAG INDEX = 50

KTAS	GROSS WEIGHT 18,000 LB LB/HR	LB/MIN	20,000 LB LB/HR	LB/MIN	24,000 LB LB/HR	LB/MIN	28,000 LB LB/HR	LB/MIN	32,000 LB LB/HR	LB/MIN	36,000 LB LB/HR	LB/MIN	TEMP* EFFECT FACTOR +20°C	−20°C
MIL	1930		2080		2470								1.04	0.94
VMIN	350		387		475								1.07	0.94
—														
—														
—														
—														
—														
360	1870	31.2											1.14	0.85
390	1750	29.2	2060	34.3									1.12	0.89
420	1710	28.5	1960	32.7									1.10	0.92
450	1710	28.5	1930	32.2									1.07	0.94
480	1770	29.5	1950	32.5	2460	41.0							1.07	0.97
510	1970	32.8	2130	35.5	2600	43.3							0.97	1.00
540	2910	48.5											0.74	1.35
MAX ENDURANCE														
KTAS	431		455		480								1.05	0.95
FUEL FLOW	1700		1930		2460								1.06	0.94
MAX RANGE														
KTAS	487		488		495								1.05	0.95
FUEL FLOW	1790		1970		2570								1.06	0.94

Figure A4-6. (Sheet 32)

Diversion Decision — Divert

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONDITIONS:

- CLIMB AT MIL, 426 KIAS TO .85M
- DESCEND AT IDLE, 205 KIAS
- STANDARD DAY
- NO FUEL RESERVE
- ZERO WIND
- ALL DESCENTS ARE TO SEA LEVEL
- DRAG INDEX = 50

IF YOU ARE AT SEA LEVEL

FUEL ON BOARD —LB	REMAIN AT SEA LEVEL	CLIMB TO OPT ALTITUDE		DESCEND	
	TOTAL DIVERT RANGE—NM	ALT/MACH	TOTAL DIVERT RANGE —NM	FROM OPT ALT —NM	FUEL USED IN DESCENT —LB
200	21	8.5K/.48	23	17	80
400	41	16.7K/.53	52	39	170
600	62	24.1K/.62	87	61	230
800	83 .42M	30.4K/.69	131	82	300
1000	103	35.4K/.75	180	103	360
1500	154	46.5K/.85	308	142	500
2000	205	46.5K/.85	433	142	500

IF YOU ARE AT 5000 FEET

FUEL ON BOARD —LB	REMAIN AT 5000 FT	CLIMB TO OPT ALTITUDE		DESCEND	
	TOTAL DIVERT RANGE—NM*	ALT/MACH	TOTAL DIVERT RANGE —NM	FROM OPT ALT —NM	FUEL USED IN DESCENT —LB
200	28	11K/.50	29	23	110
400	52	21K/.60	58	51	190
600	75	30K/.68	97	80	270
800	98 .45M	38K/.79	143	109	360
1000	121	44K/.84	194	132	450
1500	179	46.5K/.85	322	142	500
2000	236	46.5K/.85	446	142	500

*START DESCENT AT 10 NM. 40 LB FUEL USED IN DESCENT

IF YOU ARE AT 10,000 FEET

FUEL ON BOARD —LB	REMAIN AT 10,000 FT	CLIMB TO OPT ALTITUDE		DESCEND	
	TOTAL DIVERT RANGE—NM*	ALT/MACH	TOTAL DIVERT RANGE —NM	FROM OPT ALT —NM	FUEL USED IN DESCENT —LB
200	34	13K/.50	34	28	120
400	62	24.5K/.60	67	62	220
600	89	34K/.73	108	94	310
800	115 .50M	41K/.80	156	120	400
1000	141	46K/.85	208	140	490
1500	206	46.5K/.85	336	142	500
2000	270	46.5K/.85	460	142	500

*START DESCENT AT 21 NM. 90 LB FUEL USED IN DESCENT

NOTES:
(1) 4.0% RANGE GAIN FOR 10 KNOTS TAIL WIND
(2) 2.5% RANGE LOSS FOR 10 KNOTS HEAD WIND
(3) SUBTRACT 2 NM FROM DESCENT DISTANCE FOR EACH 1000 FT OF DESTINATION ELEVATION
(4) TOTAL DIVERT RANGE AT CURRENT ALTITUDE INCLUDES CRUISE AND DESCENT, AND TOTAL DIVERT RANGE AT OPTIMUM ALTITUDE INCLUDES CLIMB, CRUISE, AND DESCENT

Figure A4-7. (Sheet 1)

Diversion Decision — Divert

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONDITIONS:

- CLIMB AT MIL, 426 KIAS TO .85M
- DESCEND AT IDLE, 205 KIAS
- STANDARD DAY
- NO FUEL RESERVE
- ZERO WIND
- ALL DESCENTS ARE TO SEA LEVEL
- DRAG INDEX = 50

IF YOU ARE AT 20,000 FEET

FUEL ON BOARD —LB	REMAIN AT 20,000 FT	CLIMB TO OPT ALTITUDE		DESCEND	
	TOTAL DIVERT RANGE—NM*	ALT/MACH	TOTAL DIVERT RANGE —NM	FROM OPT ALT —NM	FUEL USED IN DESCENT —LB
200	51	21K/.60	52	52	190
400	85	31K/.69	87	84	280
600	119	39K/.80	133	113	370
800	152 .59M	45K/.85	184	136	470
1000	185	46.5K/.85	237	142	500
1500	268	46.5K/.85	364	142	500
2000	350	46.5K/.85	488	142	500

*START DESCENT AT 48 NM. 180 LB FUEL USED IN DESCENT

IF YOU ARE AT 30,000 FEET

FUEL ON BOARD —LB	REMAIN AT 30,000 FT	CLIMB TO OPT ALTITUDE		DESCEND	
	TOTAL DIVERT RANGE—NM*	ALT/MACH	TOTAL DIVERT RANGE —NM	FROM OPT ALT —NM	FUEL USED IN DESCENT —LB
200	—	—	—	—	—
400	105	35K/.75	102	98	320
600	146	42K/.81	151	124	420
800	187 .69M	46K/.85	204	140	490
1000	228	46.5K/.85	256	142	500
1500	330	46.5K/.85	383	142	500
2000	430	46.5K/.85	507	142	500

*START DESCENT AT 80 NM. 280 LB FUEL USED IN DESCENT

IF YOU ARE AT 40,000 FEET

FUEL ON BOARD —LB	REMAIN AT 40,000 FT	CLIMB TO OPT ALTITUDE		DESCEND	
	TOTAL DIVERT RANGE—NM*	ALT/MACH	TOTAL DIVERT RANGE —NM	FROM OPT ALT —NM	FUEL USED IN DESCENT —LB
200	—	—	—	—	—
400	116	40K/.80	116	116	390
600	166	46K/.85	169	140	490
800	215 .80M	46.5K/.85	221	142	500
1000	264	46.5K/.85	273	142	500
1500	385	46.5K/.85	400	142	500
2000	504	46.5K/.85	524	142	500

*START DESCENT AT 116 NM. 390 LB FUEL USED IN DESCENT

NOTES: (1) 4.0% RANGE GAIN FOR 10 KNOTS TAIL WIND
(2) 2.5% RANGE LOSS FOR 10 KNOTS HEAD WIND
(3) SUBTRACT 2 NM FROM DESCENT DISTANCE FOR EACH 1000 FT OF DESTINATION ELEVATION
(4) TOTAL DIVERT RANGE AT CURRENT ALTITUDE INCLUDES CRUISE AND DESCENT, AND TOTAL DIVERT RANGE AT OPTIMUM ALTITUDE INCLUDES CLIMB, CRUISE, AND DESCENT

Figure A4-7. (Sheet 2)

Diversion Decision — Loiter

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONDITIONS:

- CLIMB AT MIL, 426 KIAS TO .85M
- DESCEND AT IDLE, 205 KIAS
- STANDARD DAY
- NO FUEL RESERVE
- ZERO WIND
- ALL DESCENTS ARE TO SEA LEVEL
- DRAG INDEX = 50

IF YOU ARE AT SEA LEVEL

FUEL ON BOARD —LB	REMAIN AT SEA LEVEL TOTAL LOITER TIME—MIN	CLIMB TO OPT ALTITUDE ALT/MACH	CLIMB TO OPT ALTITUDE TOTAL TIME —MIN	DESCEND FROM OPT ALT —NM	DESCEND FUEL USED IN DESCENT —LB
200	5.4	8.5K/.34	5.8	17	80
400	10.8	18.5K/.42	11.7	44	170
600	16.0	28K/.5	18.2	74	250
800	21.1 .29M	37K/.62	25.3	105	350
1000	26.1	40K/.68	31.9	116	390
1500	38.2	40K/.68	47.1	116	390
2000	49.9	40K/.68	61.2	116	390

IF YOU ARE AT 5000 FEET

FUEL ON BOARD —LB	REMAIN AT 5000 FT TOTAL LOITER TIME—MIN*	CLIMB TO OPT ALTITUDE ALT/MACH	CLIMB TO OPT ALTITUDE TOTAL TIME —MIN	DESCEND FROM OPT ALT —NM	DESCEND FUEL USED IN DESCENT —LB
200	7.1	11K/.35	7.3	23	110
400	12.6	21K/.44	13.1	51	190
600	18.2	30K/.53	20.0	80	270
800	23.5 .32M	38K/.64	27.1	109	360
1000	28.8	40K/.68	33.5	116	390
1500	41.5	40K/.68	48.6	116	390
2000	53.6	40K/.68	62.9	116	390

*START DESCENT AT 10 NM. 40 LB FUEL USED IN DESCENT

IF YOU ARE AT 10,000 FEET

FUEL ON BOARD —LB	REMAIN AT 10,000 FT TOTAL LOITER TIME—MIN*	CLIMB TO OPT ALTITUDE ALT/MACH	CLIMB TO OPT ALTITUDE TOTAL TIME —MIN	DESCEND FROM OPT ALT —NM	DESCEND FUEL USED IN DESCENT —LB
200	8.4	13K/.36	8.6	28	120
400	14.5	24.5K/.48	14.9	62	220
600	20.3	34K/.59	21.9	94	310
800	26.0 .35M	40K/.68	29.0	116	390
1000	31.4	40K/.68	35.2	116	390
1500	44.5	40K/.68	50.1	116	390
2000	56.8	40K/.68	64.3	116	390

*START DESCENT AT 21 NM. 90 LB FUEL USED IN DESCENT

NOTES:
(1) LOITER TIME AT CONSTANT ALTITUDE BASED ON 10 NM HOLDING PATTERN WITH 30-DEGREE BANK TURNS
(2) ADD 0.6 MIN TO LOITER TIME FOR EACH 1000 FT OF DESTINATION ELEVATION
(3) SUBSTRACT 2 NM FROM DESCENT DISTANCE FOR EACH 1000 FT OF DESTINATION ELEVATION
(4) TOTAL LOITER TIME AT CURRENT ALTITUDE INCLUDES LOITER AND DESCENT, AND TOTAL TIME AT OPTIMUM ALTITUDE INCLUDES CLIMB, LOITER, AND DESCENT.

Figure A4-7. (Sheet 3)

Diversion Decision — Loiter

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONDITIONS:
- CLIMB AT MIL, 426 KIAS TO .85M
- DESCEND AT IDLE, 205 KIAS
- STANDARD DAY
- NO FUEL RESERVE
- ZERO WIND
- ALL DESCENTS ARE TO SEA LEVEL
- DRAG INDEX = 50

IF YOU ARE AT 20,000 FEET

FUEL ON BOARD —LB	REMAIN AT 20,000 FT TOTAL LOITER TIME—MIN*	CLIMB TO OPT ALTITUDE ALT/MACH	CLIMB TO OPT ALTITUDE TOTAL TIME —MIN	DESCEND FROM OPT ALT —NM	DESCEND FUEL USED IN DESCENT —LB
200	11.6	21K/.44	11.7	52	190
400	18.2	31K/.54	18.7	84	280
600	24.2	40K/.68	26.3	116	390
800	30.2 .44M	40K/.68	32.3	115	390
1000	36.2	40K/.68	38.5	116	390
1500	50.2	40K/.68	53.3	116	390
2000	63.5	40K/.68	67.3	116	390

*START DESCENT AT 48 NM. 180 LB FUEL USED IN DESCENT

IF YOU ARE AT 30,000 FEET

FUEL ON BOARD —LB	REMAIN AT 30,000 FT TOTAL LOITER TIME—MIN*	CLIMB TO OPT ALTITUDE ALT/MACH	CLIMB TO OPT ALTITUDE TOTAL TIME —MIN	DESCEND FROM OPT ALT —NM	DESCEND FUEL USED IN DESCENT —LB
200	—	—	—	—	—
400	21.1	35K/.60	21.5	98	320
600	27.8	40K/.68	28.3	116	390
800	34.1 .54M	40K/.68	34.6	116	390
1000	40.3	40K/.68	40.8	116	390
1500	54.9	40K/.68	55.6	116	390
2000	68.9	40K/.68	69.2	116	390

*START DESCENT AT 80 NM. 280 LB FUEL USED IN DESCENT

IF YOU ARE AT 40,000 FEET

FUEL ON BOARD —LB	REMAIN AT 40,000 FT TOTAL LOITER TIME—MIN*	CLIMB TO OPT ALTITUDE ALT/MACH	CLIMB TO OPT ALTITUDE TOTAL TIME —MIN	DESCEND FROM OPT ALT —NM	DESCEND FUEL USED IN DESCENT —LB
200	—	—	—	—	—
400	24.1	40K/.68	24.1	116	390
600	30.5	40K/.68	30.5	116	390
800	36.7 .68M	40K/.68	36.7	116	390
1000	42.7	40K/.68	42.7	116	390
1500	57.3	40K/.68	57.3	116	390
2000	70.9	40K/.68	70.9	116	390

*START DESCENT AT 116 NM. 390 LB FUEL USED IN DESCENT

NOTES:
(1) LOITER TIME AT CONSTANT ALTITUDE BASED ON 10 NM HOLDING PATTERN WITH 30-DEGREE BANK TURNS
(2) ADD 0.6 MIN TO LOITER TIME FOR EACH 1000 FT OF DESTINATION ELEVATION
(3) SUBSTRACT 2 NM FROM DESCENT DISTANCE FOR EACH 1000 FT OF DESTINATION ELEVATION
(4) TOTAL LOITER TIME AT CURRENT ALTITUDE INCLUDES LOITER AND DESCENT, AND TOTAL TIME AT OPTIMUM ALTITUDE INCLUDES CLIMB, LOITER, AND DESCENT.

Figure A4-7. (Sheet 4)

Best Cruise Altitude for Short Range Missions — Penetration Descent

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONDITIONS:

- STANDARD DAY
- NO WIND
- MIL CLIMB AT SCHEDULE KIAS OR CONSTANT ALTITUDE OPTIMUM CRUISE MACH NO., WHICHEVER IS LOWER
- CRUISE AT CONSTANT ALTITUDE AT OPTIMUM MACH
- DESCEND AT 75 PERCENT RPM WITH SPEEDBRAKES OPEN
- DESCENT SPEED = CRUISE MACH TO 300 KIAS, THEN 300 KIAS

START CLIMB GROSS WEIGHT*	TOTAL MISSION RANGE**	BEST CRUISE ALTITUDE	TOTAL FUEL CONSUMED (LB)/DESCENT RANGE (NM)					
			DI 0	DI 50	DI 100	DI 150	DI 200	DI 250
LB	NM	FT						
16,000	50	5500	480/9	500/8	510/7	530/6	560/5	590/4
16,000	75	18,300	690/25	700/21	710/18	740/16	760/14	790/12
16,000	100	28,600	810/34	830/30	840/26	880/23	920/20	950/18
16,000	125	33,100	910/38	940/33	960/29	1000/26	1040/23	1080/21
16,000	150	35,900	990/40	1030/35	1060/30	1110/27	1160/24	1210/22
16,000	200	40,000	1150/43	1210/37	1260/32	1330/29	1390/26	1460/23
16,000	250	42,600	1300/45	1370/39	1440/33	1520/30	1600/27	1690/24
20,000	50	3200	480/7	510/6	540/5	570/4	600/4	630/3
20,000	75	12,500	730/21	760/18	780/16	810/14	840/12	880/11
20,000	100	21,500	890/32	920/28	950/24	990/21	1030/19	1080/17
20,000	125	28,500	1020/40	1060/35	1090/31	1150/28	1200/25	1250/23
20,000	150	31,800	1130/43	1180/38	1220/33	1290/30	1350/27	1410/24
20,000	200	35,800	1330/47	1400/41	1460/36	1550/32	1630/29	1710/26
20,000	250	38,700	1500/50	1600/44	1690/38	1800/34	1900/31	2010/28
24,000	50	2300	510/5	540/4	570/4	610/3	640/3	680/3
24,000	75	9800	760/19	800/16	840/14	880/12	910/11	960/10
24,000	100	17,700	950/31	990/27	1030/23	1090/21	1140/19	1200/17
24,000	125	23,600	1100/38	1180/34	1250/30	1300/27	1340/24	1410/22
24,000	150	27,500	1240/43	1310/38	1370/33	1450/30	1520/27	1600/25
24,000	200	32,000	1480/48	1570/42	1650/37	1750/34	1850/31	1950/28
24,000	250	34,800	1690/51	1810/45	1920/40	2050/36	2170/33	2300/30
28,000	50	1400	520/3	560/3	600/3	640/2	680/2	720/2
28,000	75	7400	790/16	840/14	880/12	930/11	980/10	1030/9
28,000	100	14,200	1000/27	1060/24	1110/21	1180/19	1240/17	1310/16
28,000	125	20,500	1170/36	1240/32	1310/29	1390/26	1470/24	1550/22
28,000	150	24,200	1330/41	1420/37	1500/33	1590/30	1680/27	1770/25
28,000	200	28,500	1610/47	1720/42	1830/37	1950/34	2060/31	2180/28
28,000	250	31,500	1860/51	2000/45	2130/40	2280/36	2430/33	2570/30
32,000	50	600	530/2	580/1	630/1	670/1	710/1	750/1
32,000	75	5900	800/13	860/11	920/10	980/9	1040/8	1100/7
32,000	100	11,800	1040/23	1110/21	1180/19	1260/17	1330/16	1410/14
32,000	125	17,400	1240/33	1330/29	1410/26	1500/24	1590/22	1690/20
32,000	150	21,100	1410/38	1520/34	1620/31	1730/28	1830/26	1930/24
32,000	200	25,700	1730/45	1860/41	1990/37	2130/34	2260/31	2400/28
32,000	250	29,000	2010/49	2180/44	2340/40	2510/37	2680/34	2860/31

*CLIMB BEGINS AT SL

**CLIMB/CRUISE/DESCENT

Figure A4-8. (Sheet 1)

Best Cruise Altitude for Short Range Missions — Maximum Range Descent

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONDITIONS:

- STANDARD DAY
- NO WIND
- MIL CLIMB AT SCHEDULE KIAS OR CONSTANT ALTITUDE OPTIMUM CRUISE MACH NO., WHICHEVER IS LOWER
- CRUISE AT CONSTANT ALTITUDE AT OPTIMUM MACH
- DESCEND AT IDLE WITH SPEEDBRAKES CLOSED
- DRAG INDEX/DESCENT SPEED KIAS = 0/200, 50/205, AND ≥ 100/210

START CLIMB GROSS WEIGHT*	TOTAL MISSION RANGE**	BEST CRUISE ALTITUDE	TOTAL FUEL CONSUMED (LB)/DESCENT RANGE (NM)					
LB	NM	FT	DI 0	DI 50	DI 100	DI 150	DI 200	DI 250
16,000	50	15,800	340/46	350/38	370/32	400/28	430/25	450/23
16,000	75	22,000	440/69	470/57	510/46	540/40	580/36	610/33
16,000	100	26,600	550/90	580/72	620/59	660/51	710/45	760/40
16,000	125	30,600	640/112	680/88	730/71	780/61	840/54	890/48
16,000	150	33,300	740/130	780/102	830/80	890/69	960/60	1020/54
16,000	200	36,000	910/156	960/117	1030/92	1110/77	1190/67	1270/59
16,000	250	38,000	1080/182	1140/133	1220/101	1320/85	1410/73	1510/64
20,000	50	16,200	350/44	370/39	400/33	430/30	460/27	490/25
20,000	75	22,900	470/63	510/56	540/49	590/44	630/40	680/36
20,000	100	26,000	590/74	640/65	690/57	740/51	800/46	850/42
20,000	125	29,000	710/86	760/75	820/65	890/58	950/52	1020/48
20,000	150	32,000	820/98	870/85	940/74	1020/66	1100/59	1170/54
20,000	200	37,000	1010/124	1090/107	1170/91	1270/80	1360/72	1460/65
20,000	250	40,600	1190/149	1280/126	1390/107	1510/93	1620/83	1750/74
24,000	50	16,800	370/41	400/37	430/34	460/31	500/28	540/26
24,000	75	21,300	520/52	560/48	600/43	650/40	710/37	760/34
24,000	100	24,900	650/62	710/57	770/51	830/47	900/44	960/41
24,000	125	27,900	780/71	850/64	920/59	1000/54	1070/50	1150/46
24,000	150	30,700	900/80	980/73	1060/66	1150/60	1240/56	1330/52
24,000	200	35,900	1120/97	1220/89	1330/81	1440/74	1560/67	1670/62
24,000	250	39,700	1330/113	1450/104	1590/94	1740/86	1880/78	2000/70
28,000	50	14,800	400/34	430/31	470/29	510/26	550/25	590/23
28,000	75	18,900	560/43	620/39	670/36	730/34	790/32	850/30
28,000	100	23,000	720/52	780/48	860/45	930/42	1000/39	1070/37
28,000	125	26,000	860/59	940/55	1030/51	1120/48	1200/45	1290/42
28,000	150	29,100	990/67	1090/63	1190/58	1290/54	1390/51	1490/48
28,000	200	34,100	1240/81	1370/76	1500/70	1630/65	1760/61	1900/57
28,000	250	37,300	1480/89	1630/85	1800/79	1970/74	2030/68	2240/64
32,000	50	11,600	420/25	460/24	510/22	560/21	610/19	650/18
32,000	75	16,000	610/33	670/32	740/30	800/28	870/26	930/25
32,000	100	20,300	780/41	860/39	940/40	1030/35	1110/33	1190/31
32,000	125	24,000	940/50	1040/47	1140/44	1230/42	1330/39	1430/37
32,000	150	27,100	1090/56	1210/54	1320/51	1430/47	1550/45	1670/42
32,000	200	31,700	1370/65	1520/63	1660/61	1820/57	1980/53	2140/51
32,000	250	34,000	1640/71	1810/69	2000/66	2210/62	2400/58	2580/57

*CLIMB BEGINS AT SL

**CLIMB/CRUISE/DESCENT

Figure A4-8. (Sheet 2)

PART 5 - ENDURANCE

Refer to SUBSONIC CRUISE TABLES, Part 4, for endurance information.

PART 6 - DESCENT

TABLE OF CONTENTS

LIST OF CHARTS

MAXIMUM RANGE DESCENT

Maximum range descent performance data is presented in figure A6-1. The data is based on a descent speed which results in maximum distance (range) being covered during descent. Effects of GW and drag index are shown in the chart. Descent speed is tabulated on the chart.

REFER TO FIGURE A6-1.

Enter chart on sheet 1 with initial altitude (A) and project upward to intercept appropriate drag index line (B). From (B), project to the right to the baseline. Note this point on the baseline. Starting at the GW (C) on the upper block, project to the right to intercept the appropriate drag index line (B). From (B), project downward to intercept a line (D) which follows the guidelines and intercepts the point previously noted on the baseline. Continue to the right to read range (E). Repeat this process on sheet 2 in the same manner to obtain the fuel consumed (F) and time (G). If final altitude is above sea level, repeat the above process, using final altitude in place of initial altitude. The difference between the resulting values is then fuel, range, and time to descend from initial to final altitude. Obtain descent speed from the table on the chart.

SAMPLE PROBLEM.

A.	Initial altitude	=	30,000 feet
B.	Drag index	=	136
C.	GW	=	20,000 pounds
D.	Intersection point		
E.	Range	=	60 NM
F.	Fuel consumed	=	215 pounds
G.	Time	=	13.5 minutes
	Descent speed	=	210 KIAS

The above data is for a descent to sea level. If the descent was stopped at 5000 feet:

Fuel consumed = 215–40 = 175 pounds
Range = 60–8 = 52 NM
Time = 13.5–2.0 = 11.5 minutes

PENETRATION DESCENT

Fuel consumed, distance, and time to execute a penetration descent are shown in figure A6-2. The data is based on using 75 percent rpm, 300 KIAS, and speedbrakes open. Effects of GW and drag index are shown on the chart.

REFER TO FIGURE A6-2.

Enter chart with initial altitude (A) and project upward to intercept appropriate drag index line in the time, range, and fuel blocks (B). From (B), project to the right to GW baseline and follow guidelines to GW (C). Continue to the right to read fuel consumed (D), range (E), and time (F). If final altitude is above sea level, repeat the above process using final altitude in place of initial altitude. The difference

between the resulting values is then fuel, range, and time to descend from initial to final altitude.

SAMPLE PROBLEM.

A.	Initial altitude	= 30,000 feet
B.	Drag index	= 136
C.	GW	= 20,000 pounds
D.	Fuel consumed	= 300 pounds
E.	Range	= 30 NM
F.	Time	= 5 minutes

The above data is for a descent to sea level. If the descent was stopped at 5000 feet:

Fuel consumed = 300–80 = 220 pounds
Range = 30–5 = 25 NM
Time = 5–1 = 4 minutes

DESCENT WITH INOPERATIVE ENGINE

Figure A6-3 contains time and distance data for a descent with an inoperative engine. The data is presented as a function of descent airspeed for descents from various initial altitudes to sea level. Minimum EPU operating time is shown.

The chart is intended to be used to estimate the time available for engine airstart attempts once the aircraft has been maneuvered into the airstart envelope and may also be used to obtain glide distance with the engine inoperative.

REFER TO FIGURE A6-3.

Enter the chart with airspeed (A); project upward to the appropriate GW/altitude line (B) and then to the left to read time (C) and distance (D). To determine time and distance available to descend to another altitude, repeat the above steps for the final altitude and take the difference between the sets of data.

SAMPLE PROBLEM.

A.	Descent airspeed	= 250 KIAS
B.	GW/altitude	= 17,000 pounds/ 40,000 feet
C.	Time (to sea level)	= 9.2 minutes
D.	Distance (to sea level)	= 51.5 NM

If the descent was stopped at 5000 feet:

Time = 9.2–1.4 = 7.8 minutes
Distance = 51.5–6 = 45.5 NM

Maximum Range Descent — IDLE

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONFIGURATION:
• SPEEDBRAKES – CLOSED

CONDITIONS:
• STANDARD DAY

DESCENT SPEED	
DRAG INDEX	KIAS
0	200
50	205
100	210
200	210
300	210
400	210

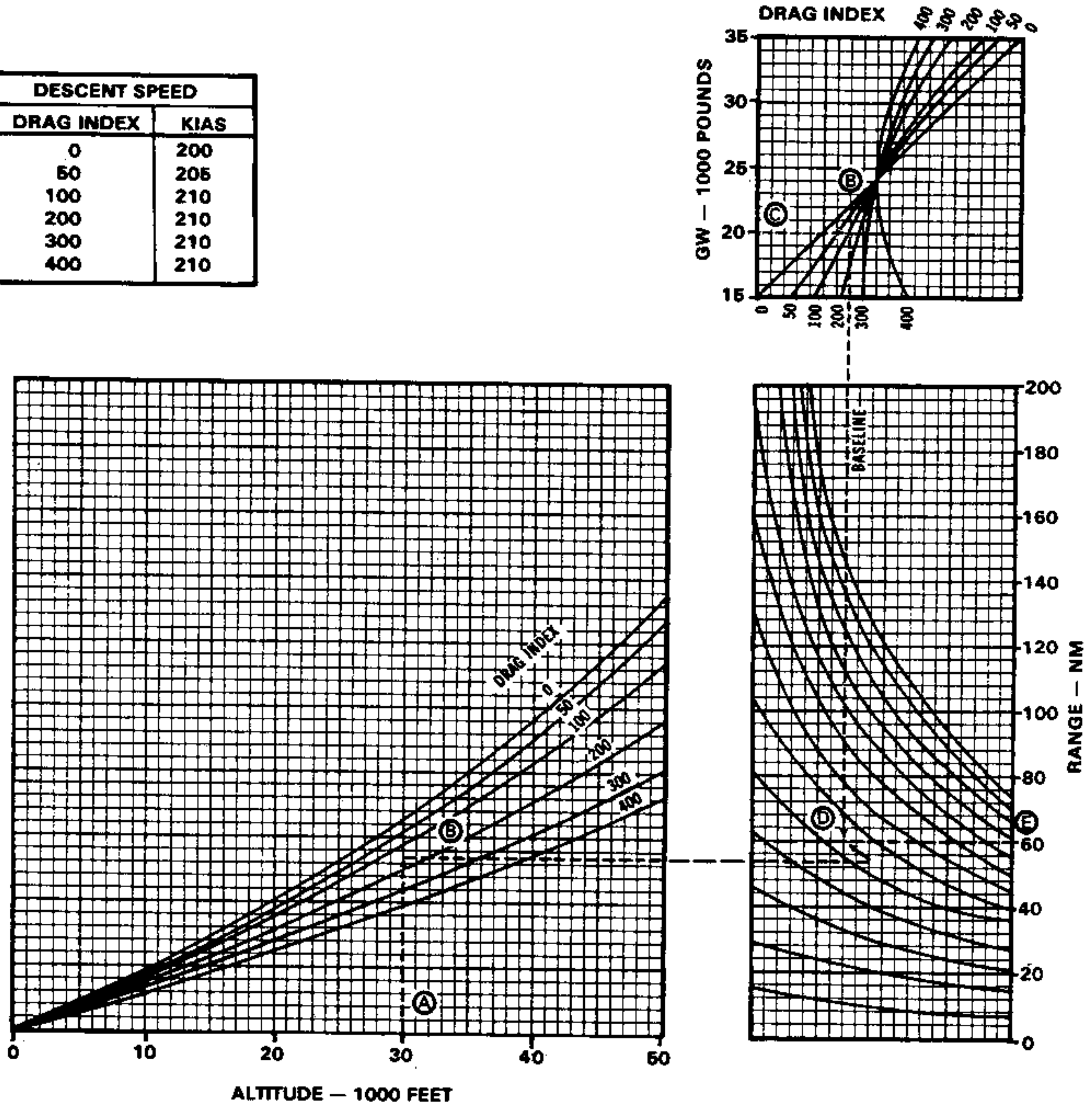


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Figure A6-1. (Sheet 1)

Maximum Range Descent — IDLE

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONFIGURATION:
- SPEEDBRAKES – CLOSED

CONDITIONS:
- STANDARD DAY

DESCENT SPEED	
DRAG INDEX	KIAS
0	200
50	205
100	210
200	210
300	210
400	210

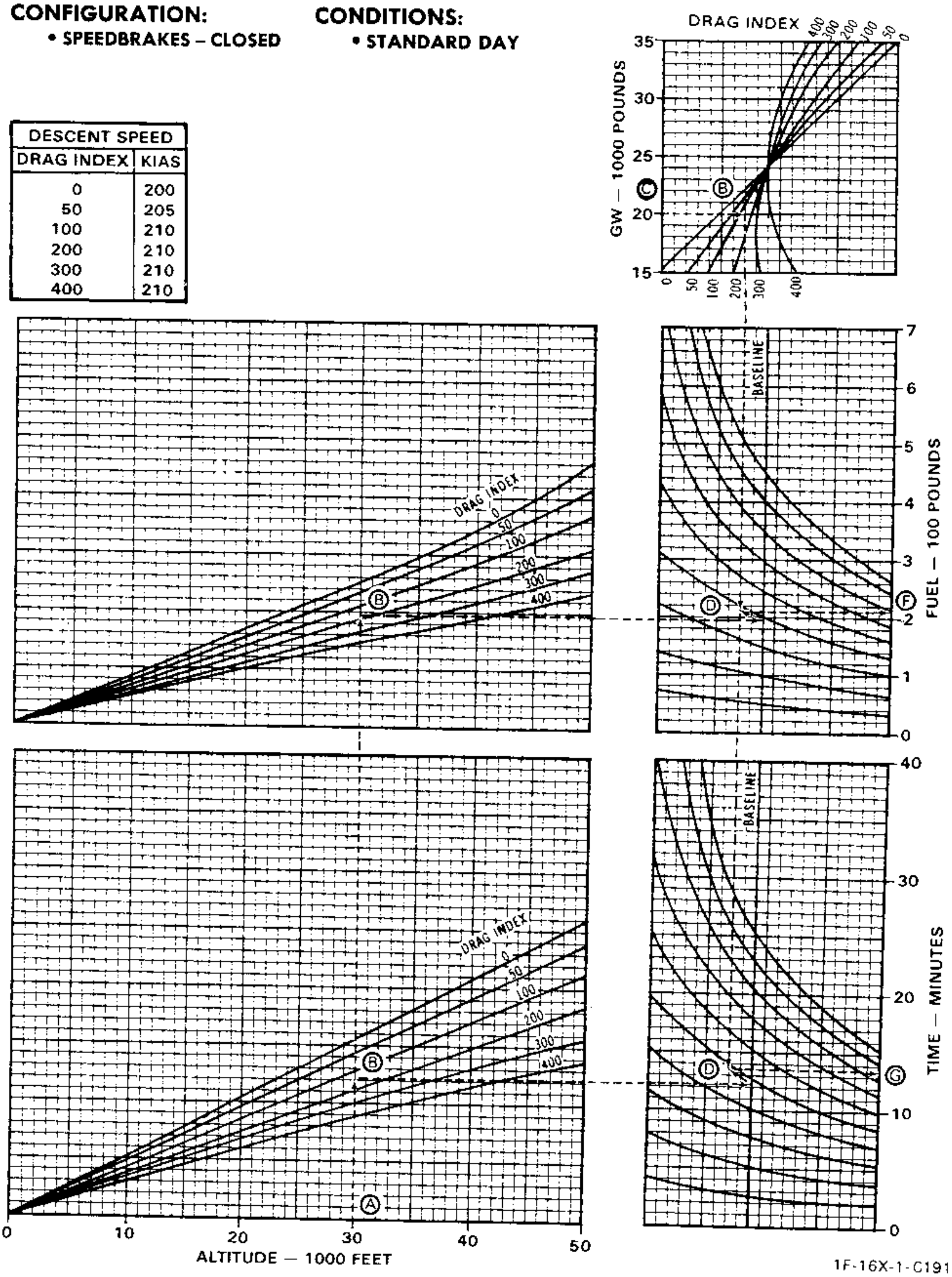

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Figure A6-1. (Sheet 2)

Penetration Descent

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONFIGURATION:
- SPEEDBRAKES – OPEN

CONDITIONS:
- 75 PERCENT RPM
- DESCENT SPEED = CRUISE MACH TO 300 KIAS, THEN 300 KIAS
- STANDARD DAY

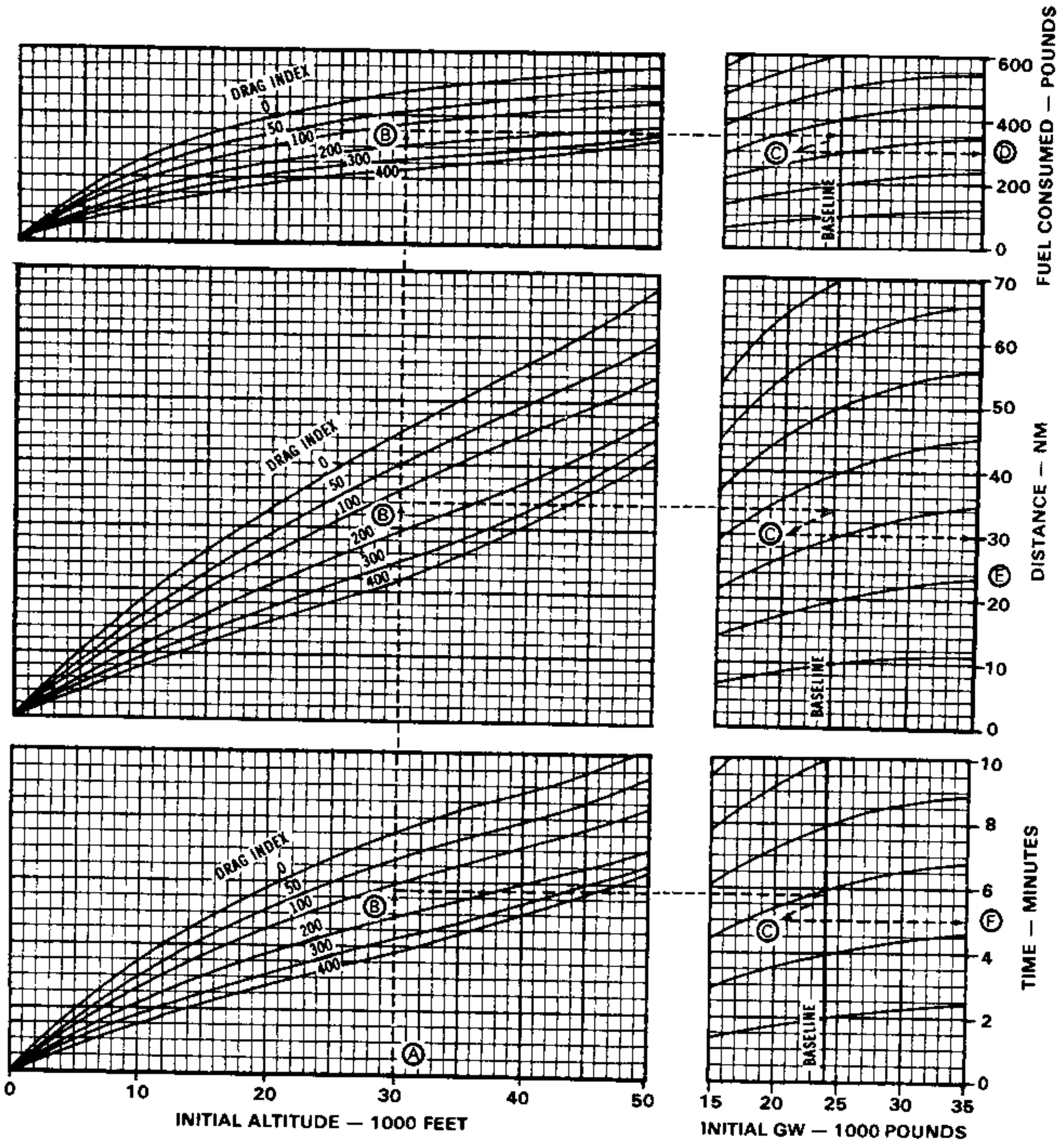

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Figure A6-2.

Descent With Inoperative Engine

DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- DRAG INDEX = 0

CONDITIONS:
- WINDMILLING ENGINE OR LOCKED ROTOR
- NO WIND

NOTE: REDUCE TIME AND DISTANCE 1% FOR EACH 5 INCREASE IN DRAG INDEX.

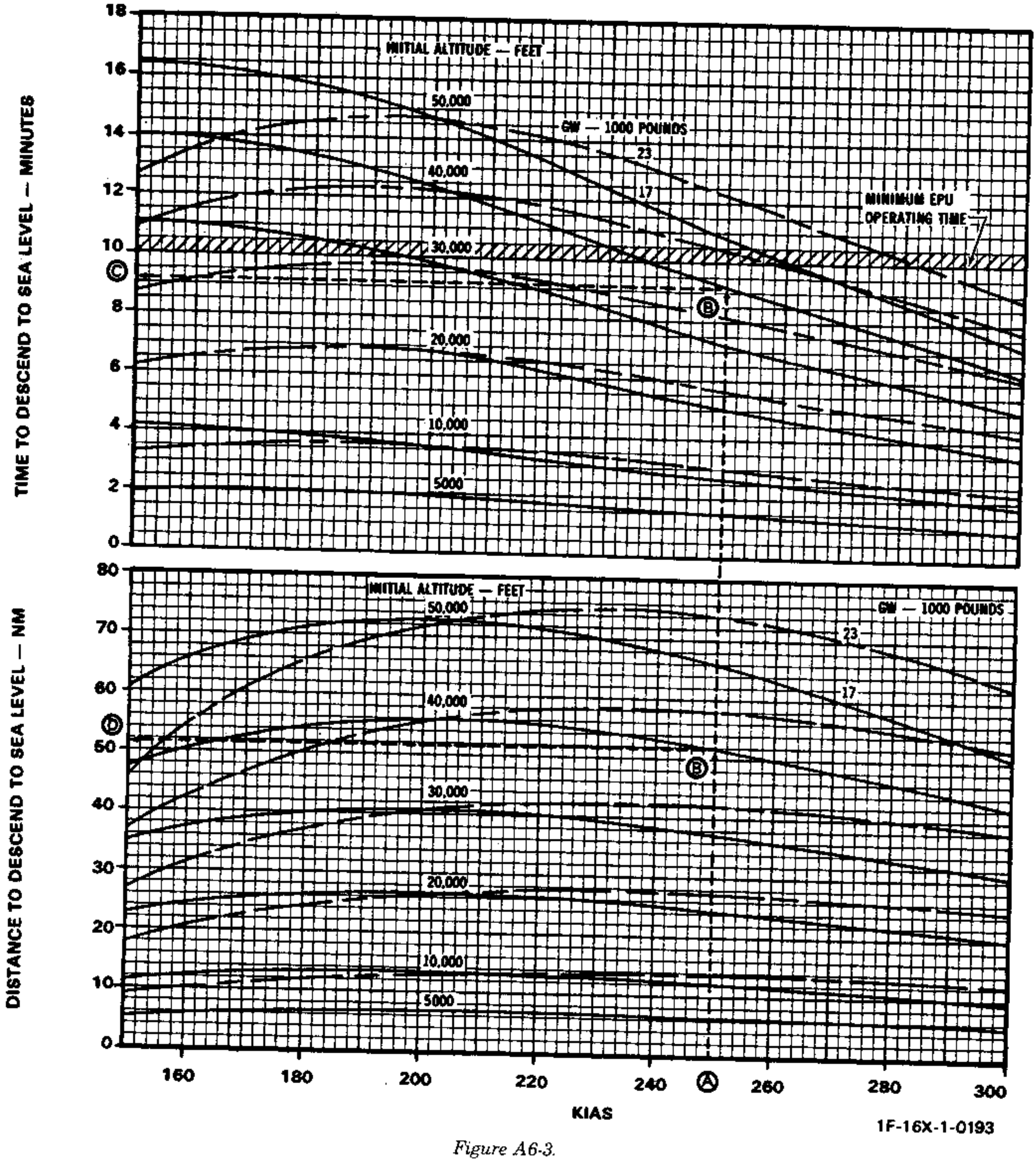

Figure A6-3.

PART 7 - LANDING

TABLE OF CONTENTS

LIST OF CHARTS

DEFINITION OF TERMS

Aerodynamic braking (two-point attitude) – Use of speedbrakes and maximum of 13 degrees AOA until deceleration to 80 KIAS.

Maximum effort braking – A single continuous wheel brake application using maximum pedal pressure (antiskid on) in conjunction with two-point aerodynamic braking (consistent with maintaining directional control). When wheel brakes become effective, the aircaft will automatically rotate to the three-point attitude. On a dry runway, this will occur soon after wheel brakes are applied. After the nose tire is on the runway, maintain full aft stick short of nose tire lift-off and open speedbrakes fully. NO Use drag chute in conjunction with wheel brake application and allow aircraft to rotate to the three-point attitude as the drag chute opens.

LANDING SPEED

Final approach and touchdown airspeeds are given in figure A7-1. Both airspeeds are based on 13 degrees AOA, matching the AOA indexer on speed indication.

SAMPLE PROBLEM.

A.	GW	= 20,000 pounds
B.	Touchdown speed	= 125 KIAS
C.	Final approach speed	= 136 KIAS

SHORT FIELD LANDING

Ground roll distance for minimum distance landing is given in figure A7-2 (sheets 1 through 5).

Data for measured runway condition readings (RCR) not provided on the charts can be obtained by interpolation. Lines representing RCR = 18 (wet), 12 (wet), and 10 (wet) should be used to interpolate for other RCR values measured on wet surface. All other lines represent RCR's for surface which has no liquid moisture present; i.e., the runway surface is dry or has only frozen covering such as snow or ice.

REFER TO FIGURE A7-2.

Enter sheets 1 and NO 4 with pressure altitude (A); project to the right to temperature (B), then down to GW (C), and finally to the right and read uncorrected ground roll distance (D). Enter sheets 2, 3, and NO 5 with uncorrected ground roll distance (D), follow the wind guidelines to wind (E), project to the right to slope baseline, follow the guidelines to slope (F), continue to the right to the reported RCR (G) or (I), and finally project down to read corrected ground roll distance (H) or (J).

SAMPLE PROBLEM (SHEET 1).

A.	Altitude	= 2000 feet
B.	Temperature	= 42°C
C.	GW	= 20,000 pounds
D.	Uncorrected ground roll distance	= 3470 feet

SAMPLE PROBLEM (SHEET 2).

D. Uncorrected ground roll distance = 3470 feet
E. Wind = 10 knots (headwind)
F. Slope = 1 percent (uphill)
G. RCR = 16
H. Corrected ground roll distance = 3100 feet
I. RCR = 4
J. Corrected ground roll distance = 7800 feet

SAMPLE PROBLEM (SHEET 3).

D. Uncorrected ground roll distance = 3670 feet
E. Wind = 10 knots (headwind)
F. Slope = 1 percent (uphill)
G. RCR = 16
H. Corrected ground roll distance = 3400 feet
I. RCR = 8
J. Corrected ground roll distance = 6300 feet

NO SAMPLE PROBLEM (SHEET 4).

A. Altitude = 2000 feet
B. Temperature = 42°C
C. GW = 20,000 pounds
D. Uncorrected ground roll distance = 2050 feet

NO SAMPLE PROBLEM (SHEET 5).

D. Uncorrected ground roll distance = 2050 feet
E. Wind = 10 knots (headwind)
F. Slope = 1 percent (uphill)
G. RCR = 16
H. Corrected ground roll distance = 1850 feet
I. RCR = 4
J. Corrected ground roll distance = 3175 feet

Landing Speed

DATA BASIS: FLIGHT TEST

ENGINE: F100-PW-200

CONFIGURATION:
- ALL DRAG INDICES

CONDITIONS:
- ALL TEMPERATURES
- ALL ALTITUDES
- 13 DEGREES AOA (INDEXER ON SPEED)

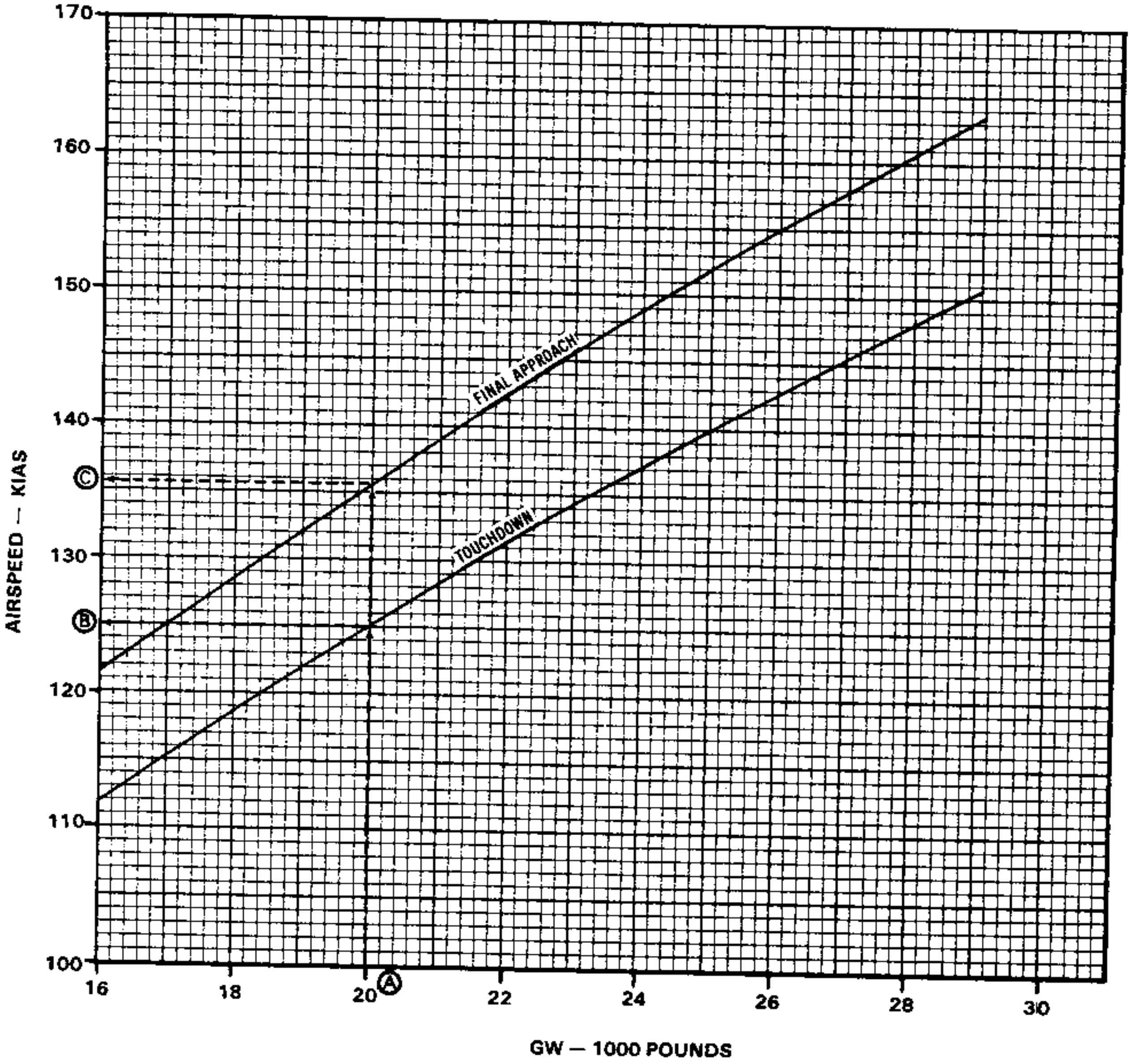

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Figure A7-1.

Short Field Landing Distance (Uncorrected)

DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- ALL DRAG INDICES
- SPEEDBRAKES – OPEN

CONDITIONS:
- TOUCH DOWN AT 13 DEGREES AOA
- ZERO WIND AND SLOPE
- IDLE OR *BUC IDLE SELECTED AT TOUCHDOWN
- MAX EFFORT BRAKING
- DRY CONCRETE RUNWAY

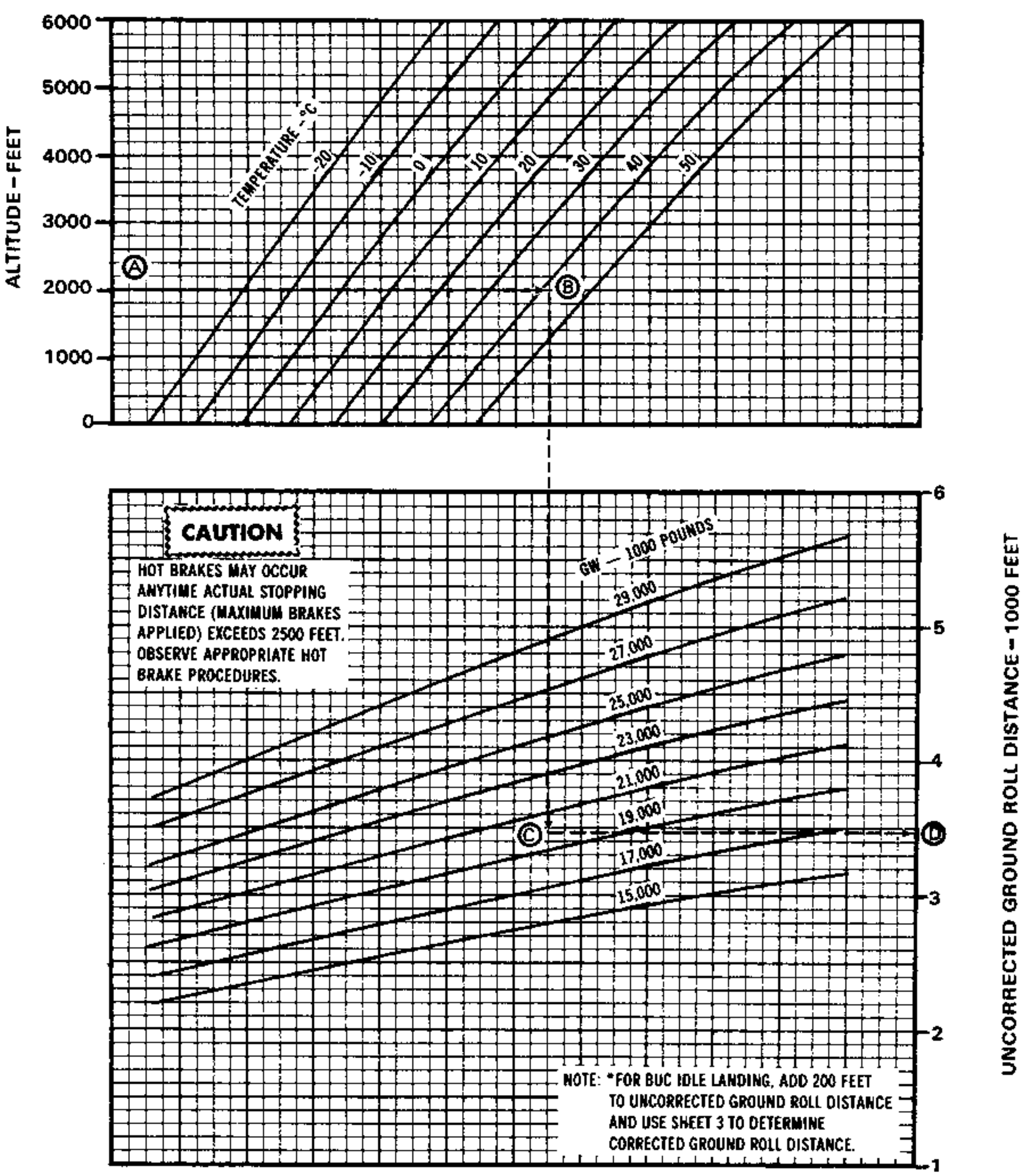

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Figure A7-2. (Sheet 1)

Short Field Landing Distance (Corrected)

DATA BASIS: FLIGHT TEST AND ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- ALL DRAG INDICES
- SPEEDBRAKES – OPEN

CONDITIONS:
- TOUCH DOWN AT 13 DEGREES AOA
- IDLE SELECTED AT TOUCHDOWN
- MAX EFFORT BRAKING
- ENTER CHART WITH UNCORRECTED GROUND ROLL DISTANCE FROM SHEET 1

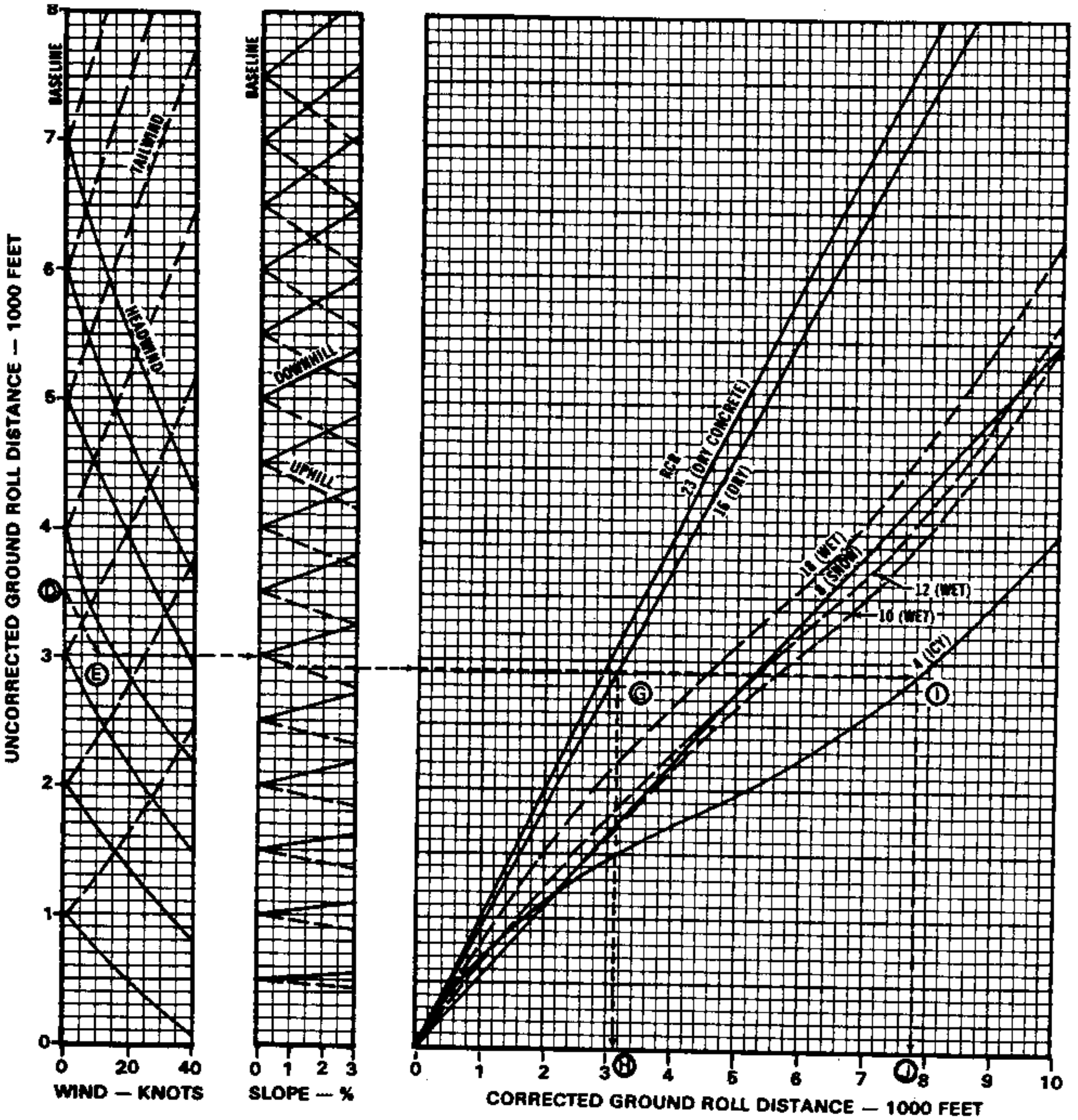

Figure A7-2. (Sheet 2)

Short Field Landing Distance — With BUC IDLE (Corrected)

DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- ALL DRAG INDICES
- SPEEDBRAKES – OPEN

CONDITIONS:
- TOUCH DOWN AT 13 DEGREES AOA
- BUC IDLE SELECTED AT TOUCHDOWN
- MAX EFFORT BRAKING
- ENTER CHART WITH UNCORRECTED GROUND ROLL DISTANCE

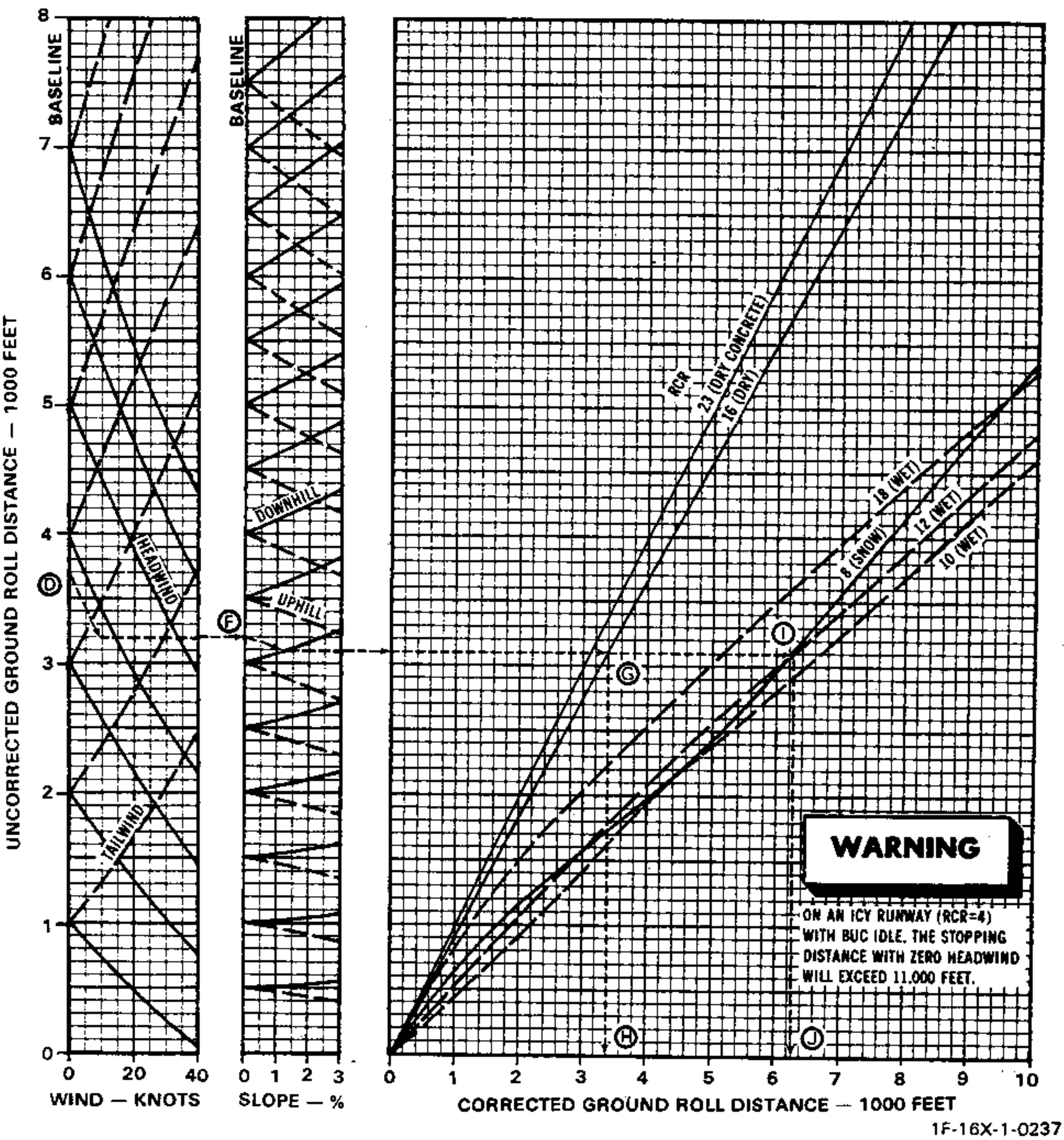

Figure A7-2. (Sheet 3)

Short Field Landing Distance — With Drag Chute (Uncorrected) NO

DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- ALL DRAG INDICES
- SPEEDBRAKES – OPEN
- DRAG CHUTE – DEPLOYED

CONDITIONS:
- TOUCH DOWN AT 13 DEGREES AOA
- ZERO WIND AND SLOPE
- IDLE OR *BUC IDLE SELECTED AT TOUCHDOWN
- MAX EFFORT BRAKING
- DRY CONCRETE RUNWAY

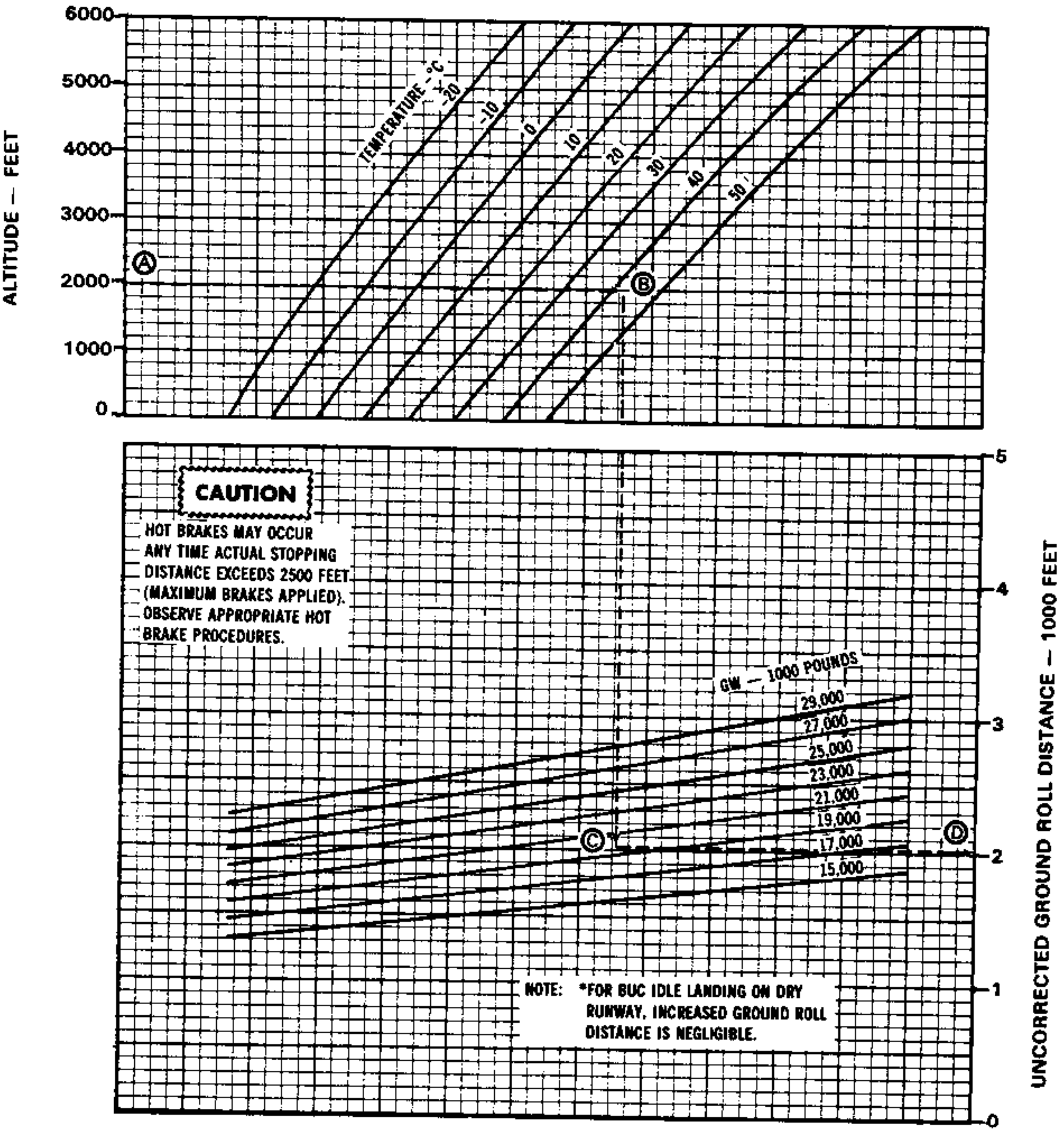

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Figure A7-2. (Sheet 4)

Short Field Landing Distance — With Drag Chute (Corrected) NO

DATA BASIS: ESTIMATED

ENGINE: F100-PW-200

CONFIGURATION:
- ALL DRAG INDICES
- SPEEDBRAKES – OPEN
- DRAG CHUTE – DEPLOYED

CONDITIONS:
- TOUCH DOWN AT 13 DEGREES AOA
- IDLE OR *BUC IDLE SELECTED AT TOUCHDOWN
- MAX EFFORT BRAKING
- ENTER CHART WITH UNCORRECTED GROUND ROLL DISTANCE FROM SHEET 4

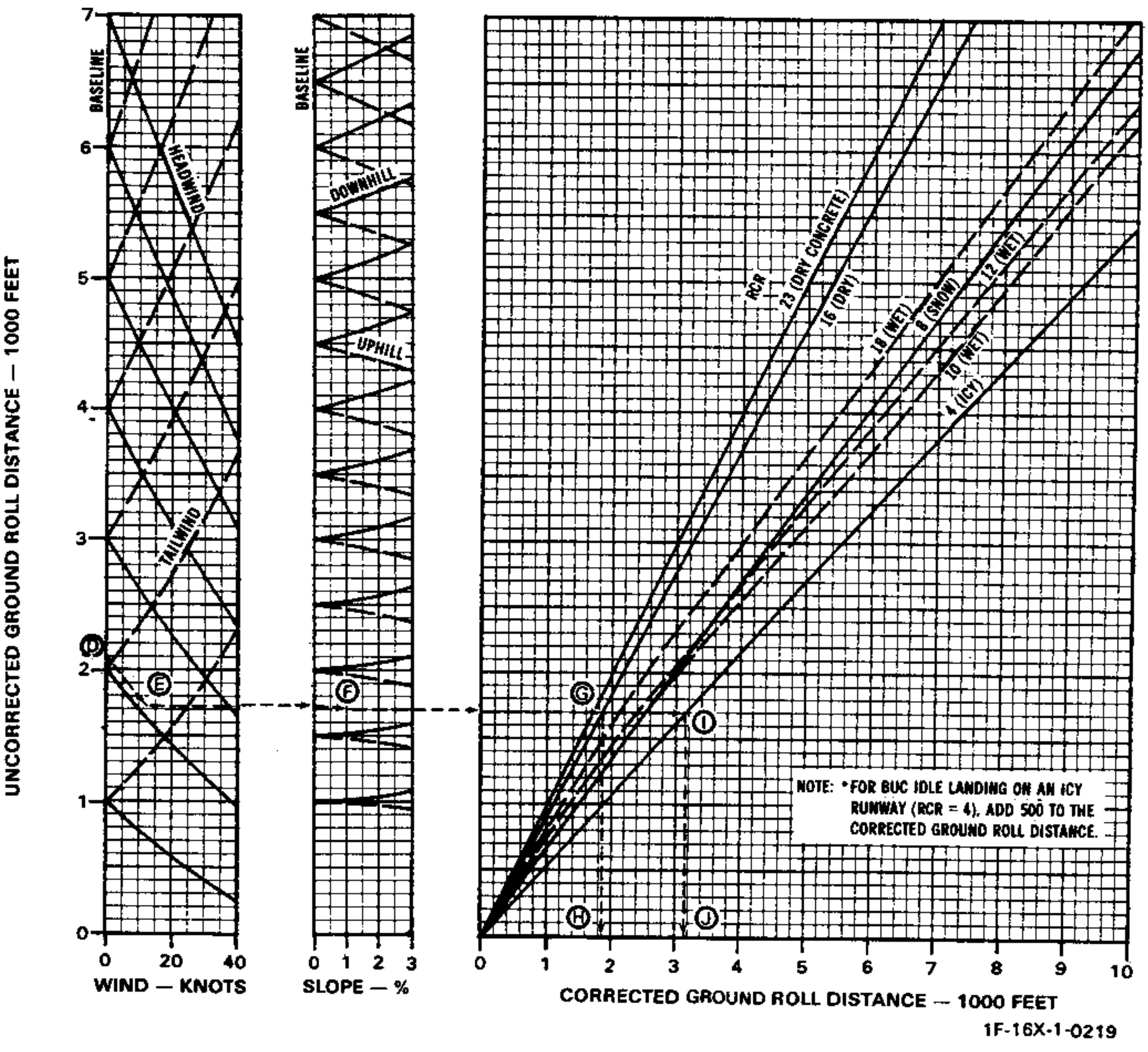

Figure A7-2. (Sheet 5)

GLOSSARY

STANDARD AND NONSTANDARD ABBREVIATIONS

A

A/A	Air to Air
AAM	Air-to-Air Missile
AB	Afterburner
ac, AC	Alternating Current
A/C, ACFT	Aircraft
A/C GW	Aircraft Gross Weight
ACM	Air Combat Mode
ACMI	Air Combat Maneuvering Instrumentation
ADC	Air Data Converter
ADG	Accessory Drive Gearbox
ADI	Attitude Director Indicator
AGL	Above Ground Level
AGM	Air-to-Ground Missile
AIM	Air Intercept Missile
AIS	Aircraft Instrumentation System
AJ	Antijamming
AL	Aft Left
ALT	Altitude or Altimeter or Alternate
AM	Amplitude Modulation
AMMO	Ammunition
AMRAAM	Advanced Medium Range Air-to-Air Missile
ANT	Antenna
AOA	Angle-of-Attack
AP	Autopilot
AR, A/R	Air Refueling
ARI	Aileron-Rudder Interconnect
ARMT	Armament
ATT	Attitude
AUX	Auxiliary
AVTR	Airborne Video Tape Recorder

B

BAK–	Arresting Cable Prefix (e.g., BAK–9)
BARO	Barometric
BATT	Battery
BDU	Bomb Dummy Unit
BIT	Built-In Test or Binary Digit
BLU	Bomb Live Unit
BUC	Backup Fuel Control

C

CADC	Central Air Data Computer
CBU	Cluster Bomb Unit
CCIP	Continuously Computed Impact Point
CCRP	Continuously Computed Release Point
CCW	Counterclockwise
CDI	Course Deviation Indicator
CENC	Convergent Exhaust Nozzle Control
CG	Center of Gravity
CHAN	Channel
CIU	Central Interface Unit
CIVV's	Compressor Inlet Variable Vanes
CONFIG	Configuration
CONT	Control
CO2	Carbon Dioxide
CRS	Course
CRV	Canadian Rocket Vehicle
CSD	Constant-Speed Drive
CTVS	Cockpit Television Sensor
CW	Clockwise

D

dBA	Adjusted (Human Ear Response) Decibels
dc, DC	Direct Current
DI	Drag Index
DIA	Diameter
DIFF	Differential
DIS	Disable
DISC	Disconnect
DME	Distance Measuring Equipment
DN	Down
DSG	Designate/Return to Search
DTOS	Dive Toss
DVAL	D-Value

E

EAS	Equivalent Airspeed
ECA	Electronic Component Assembly
ECM	Electronic Countermeasures
ECP	Engineering Change Proposal
ECS	Environmental Control System
EEC	Electronic Engine Control
EED	Electro-Explosive Device
ELECT	Electronic (Primary Altimeter Operating Mode)
ELV	Elevation
EMER	Emergency

ENG	Engine
EPU	Emergency Power Unit
EQUIP	Equipment
EST	Estimate
EXT	External

F

FC	Flight Control
FCC	Fire Control Computer
FCNP	Fire Control/Navigation Panel
FCR	Fire Control Radar
FCS	Flight Control System
FF	Fuel Flow
FFAR	Folding-Fin Aircraft Rocket
FFP	Fuel Flow Proportioner
FLCC	Flight Control Computer
FLCP	Flight Control Panel
FLCS	Flight Control System
FM	Frequency Modulation
FO	Foldout
FOD	Foreign Object Damage
FORM	Formation
FPM, fpm	Feet per Minute
FR	Forward Right
FT, ft	Feet
FTIT	Fan Turbine Inlet Temperature
FWD	Forward

G

g, G	Gravity
gal, GAL	Gallon
GBU	Guided Bomb Unit
GCA	Ground Controlled Approach
GEN	Generator
GM	Ground Map
GND	Ground
GP	Group
GS	Glide Slope
GW	Gross Weight

H

HDG	Heading
HDG SEL	Heading Select
HF	High Frequency
HQ	HAVE QUICK
HSI	Horizontal Situation Indicator
HUD	Head-Up Display
HYD	Hydraulic
HYDRAZN	Hydrazine
Hz	Hertz

I

IAS	Indicated Airspeed
IAW	In Accordance With
ID	Identification
IFF	Identification, Friend or Foe
ILS	Instrument Landing System
IN., In.	Inches
INC	Increase
IND	Indicator
INOP	Inoperative
INS	Inertial Navigation Set (or System)
INT	Intensity or Internal or Interval
INST, INSTR	Instrument
INU	Inertial Navigation Unit
I/P	Identification of Position
ISA	Integrated Servoactuator

J

JETT/JTSN	Jettison
JFS	Jet Fuel Starter

K

K	Thousand (e.g., 40K = 40,000)
KCAS	Knots Calibrated Airspeed
KEAS	Knots Equivalent Airspeed
KIAS	Knots Indicated Airspeed
KT(S)	Knot(s)
KTAS	Knots True Airspeed
KVA	Kilovolt Ampere

L

L	Left
LADD	Low Angle Drogue Delivery
LAU	Launcher Armament Unit
lb, LB	Pound(s)
LB/HR	Pounds per Hour
LB/MIN	Pounds per Minute
LCOS	Lead Computing Optical Sight
LD	Load or Low Drag
LE	Leading Edge
LEF's	Leading Edge Flaps
LG	Landing Gear
LMLG	Left Main Landing Gear
LOC	Localizer
LPU	Life Preserver Unit
LRU	Line Replaceable Unit
LTS	Lights
LWD	Left Wing Down

M

M	Mach
MAC	Mean Aerodynamic Chord
MAL	Malfunction
MAL & IND	Malfunction and Indicator
MAN	Manual
MAU	Miscellaneous Armament Unit
MAX	Maximum
MAX AB	Maximum Afterburner
MECH	Mechanical
MEM	Memory
MFL	Maintenance Fault List
mHz, MHz	Megahertz
MIC	Microphone
MIL	Military Power
MIN	Minute or Minimum
MK	Mark (Equivalent of Model)
MLG	Main Landing Gear
MM, mm	Millimeter
MPO	MANUAL PITCH Override
MRK BCN	Marker Beacon
ms, MS	Milliseconds
MSL	Missile or Mean Sea Level
MUX BUS	Multiplex Bus

N

N/A	Not Applicable
NAM	Nautical Air Miles
NLG	Nose Landing Gear
NM	Nautical Miles
No., NO.	Number
NORM	Normal
NOZ POS	Nozzle Position
NWS	Nosewheel Steering

O

OAT	Outside Air Temperature
OHEAT	Overheat
OP	Operational or Optimum
OPT	Optional
OVRD	Override
OXY	Oxygen

P

PMG	Permanent Magnet Generator
PNEU	Pneumatic (Secondary Altimeter Operating Mode)
PNL	Panel
pph, PPH	Pounds per Hour
PRE	Preset
PRESS	Pressure, Pressurization
PSR	Pneumatic Sensor Assembly
psi, PSI	Pounds per Square Inch
PTO	Power Takeoff (Shaft from engine gearbox to ADG)
PWR	Power

Q

QTY	Quantity

R

RAD	Radio (e.g., RAD 1 or RAD 2)
RCFI	Radio Channel/Frequency Indicator
RCR	Runway Condition Reading
RCVV	Rear Compressor Variable Vanes
RDR	Radar
RDY	Ready
REL	Release
REO	Radar/Electro-Optical
RET SRCH	Return to Search
RIT	Reduced Idle Thrust
RMLG	Right Main Landing Gear
RNDS	Rounds (Gun)
RNG	Ranging
rpm, RPM	Revolutions per Minute
RS	Return-to-Search
RSVR	Reservoir
RT	Retarded
RV	Receive Variable
RWD	Right Wing Down

S

SAI	Standby Attitude Indicator
SCP	Stores Control Panel
SEL	Select
SFO	Simulated Flameout Landing
SIF	Selective Identification Feature
SL	Sea Level
SMS	Stores Management System
SNSR	Sensor
SPD BRK	Speedbrake
SPL	Sound Pressure Level
SQ	Squelch or Square
STA	Station
STAPAC	Stabilization Package
STBY	Standby
STD	Standard
SUU	Suspension Utility Unit
SV	Secure Voice
SW	Switch
SYM	Symmetrical
SYS	System

T

TACAN	Tactical Air Navigation
TAS	True Airspeed
TCN	TACAN
TEF's	Trailing Edge Flaps
TEMP	Temperature
TER	Triple Ejector Rack
TEU	Trailing Edge Up
TGM	Training Guided Missile
TGT	Target
THEO	Theory
TISL	Target Identification Set, Laser
T.O.	Takeoff
TOD	Time-of-Day
TR, T/R	Transmit/Receive
TRV	Travel
TT	Total Temperature
TV	Television
TVS	Television Sensor
TWS	Threat Warning System

U

UFC	Unified Fuel Control
UHF	Ultra High Frequency
UNK	Unknown

V

VAC	Volts ac
VDC	Volts dc
VHF	Very High Frequency
VIP	Visual Initial Point
VMC	Visual Meteorological Conditions
VOL	Volume
VVI	Vertical Velocity Indicator
VWCS	Voice Warning/Caution System

W

W/	With
WB	Wideband
W/O	Without
WOD	Word-of-Day
WOW	Weight-on-Wheels
WPN	Weapon
WPN REL	Weapon(s) Release
wt, WT	Weight

Y

Y	Yaw

TERMS/SYMBOLS

An	Normal Acceleration (G's)
$\dot{\phi}$	Roll Rate (Deg/Sec)
$\dot{\psi}$	Yaw Rate (Deg/Sec)
Ay	Lateral Acceleration (Ft/Sec2)
$\dot{\theta}$	Pitch Rate (Deg/Sec)
α	AOA (Deg)
Pt	Total Pressure
Ps	Static Pressure or Specific Power (Energy Rate)
qc	Impact Pressure (Pt – Ps)
β	Angle of Sideslip
Fe	Elevator Stick Force (lb)
Fa	Aileron Stick Force (lb)
Fp	Rudder Pedal Force (lb)
N2	Engine Compressor RPM or Nitrogen
Vc	Calibrated Airspeed
Vmax	Maximum Power
Vt	True Airspeed
ΔH	Delta Change Altitude (Ft)
$\dot{H}$	Altitude Rate (FPS)

INDEX

* Denotes Illustration

* Denotes Illustration

* Denotes Illustration

* Denotes Illustration

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* Denotes Illustration

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* Denotes Illustration

* Denotes Illustration

FOLDOUT ILLUSTRATIONS

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5. AOA Transmitter
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8. Cockpit Pressure Safety Valve
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10. Instrument Panel
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12. Ejection Seat
13. Fixed Canopy
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15. Missile Launcher
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17. Position/Formation Light
18. TACAN Upper Antenna
19. Static Discharger
20. LEF Drive Unit
21. Hydraulic Reservoir
22. AR Slipway
23. IFF/UHF Communications and TWS Antenna
24. Flight Control Hydraulic Accumulators
25. Anticollision Light Power Supply
26. Vertical Stabilizer Attach Fittings
27. Vertical Stabilizer
28. **BLOCK 15** Vertical Tail Mounted Floodlight
29. VHF Communications Antenna
30. Anticollision Strobe
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32. Rudder
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41. Horizontal Tail
42. Formation Light
43. Flaperon ISA
44. Hook
45. Flaperon
46. Wing Structural Box
47. Fixed Trailing Edge Panel
48. LEF's Rotary Actuator
49. LEF's Torque Shaft
50. LEF's
51. Wing Attach Fittings
52. MLG
53. MLG Door
54. LEF's Drive Angle Gear Box
55. Air Conditioning Package
56. M61A1 20 mm Gun
57. Ammunition Drum
58. EPU Nitrogen Bottle
59. Gun Port
60. NLG Door
61. Total Temperature Probe
62. Position Light
63. NLG
64. **BLOCK 10** TWS Antenna
65. **BLOCK 10** IFF/UHF Communications Lower Antenna
66. Engine Air Inlet
67. Left Console
68. Throttle
69. Strake
70. Lower Equipment Compartment
71. ID Light DE NO A

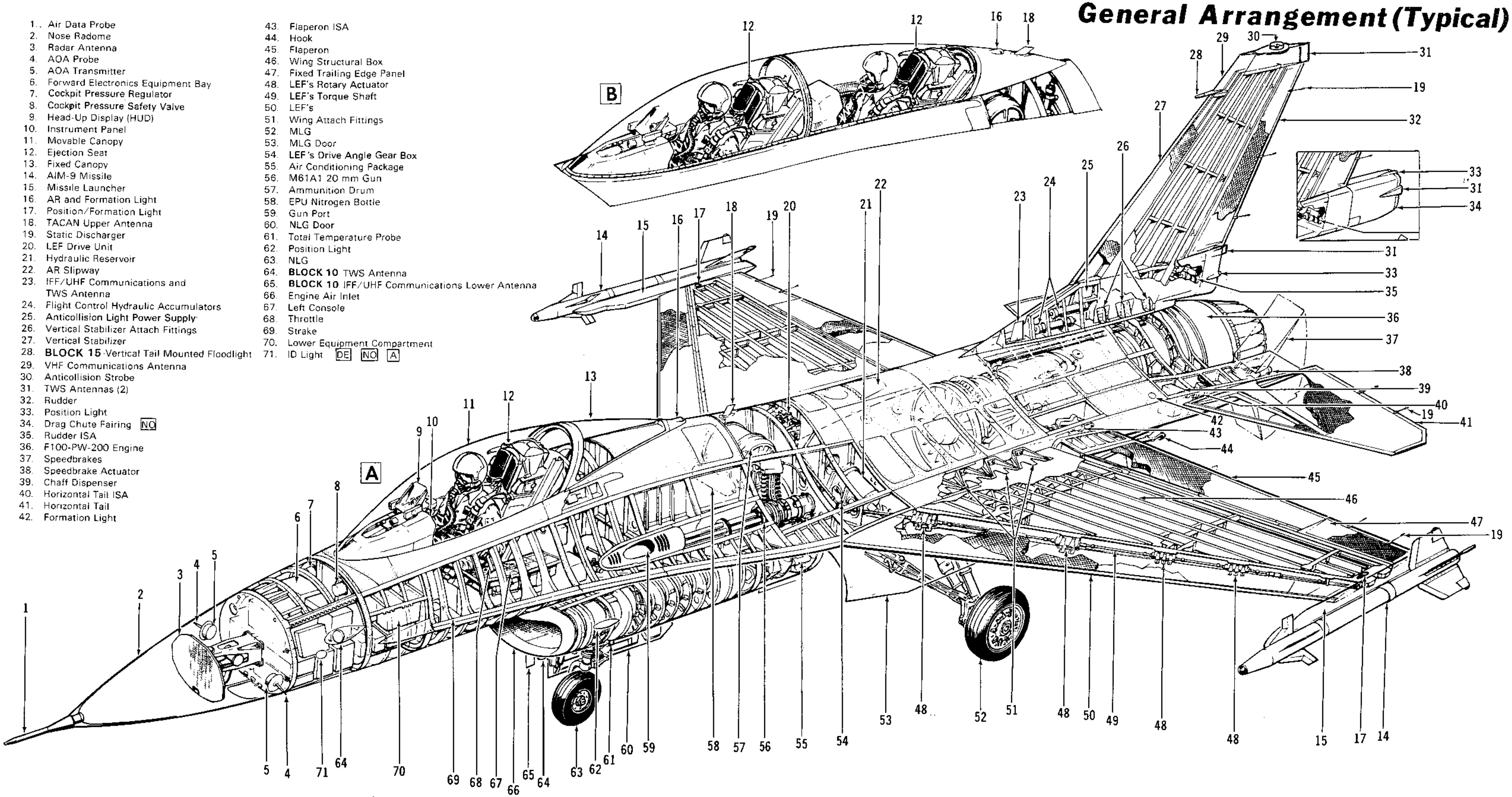


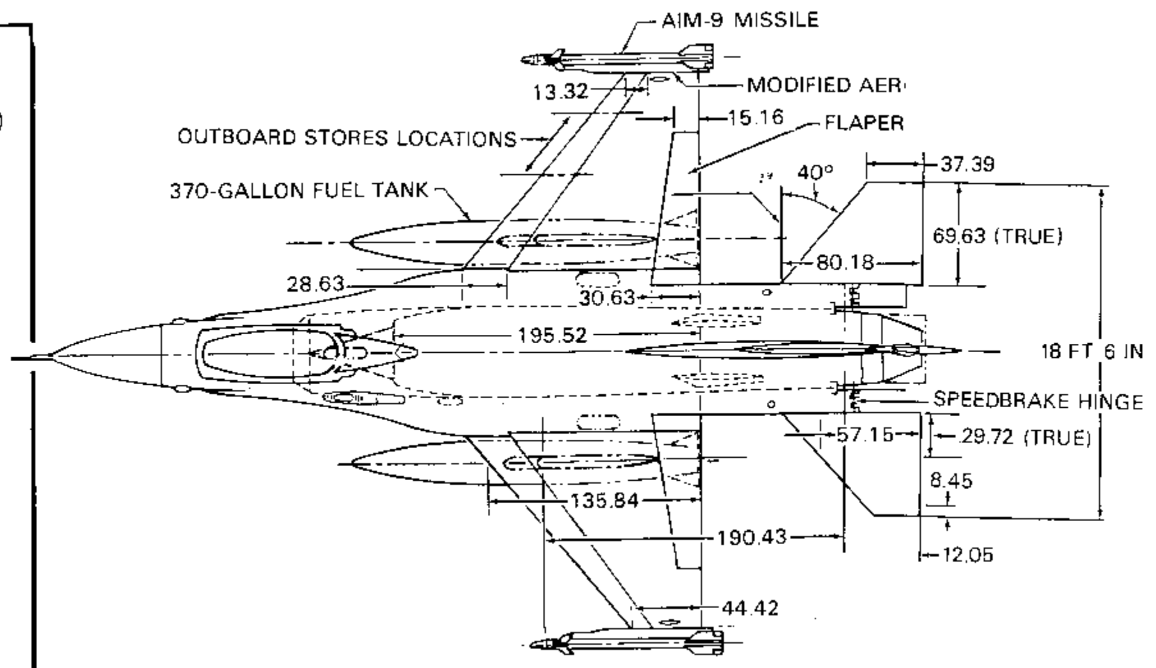
Figure FO-1.

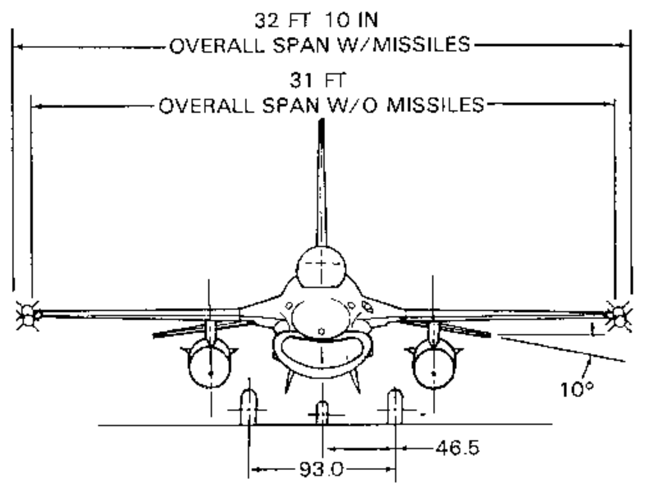
1F-16A-1-0122

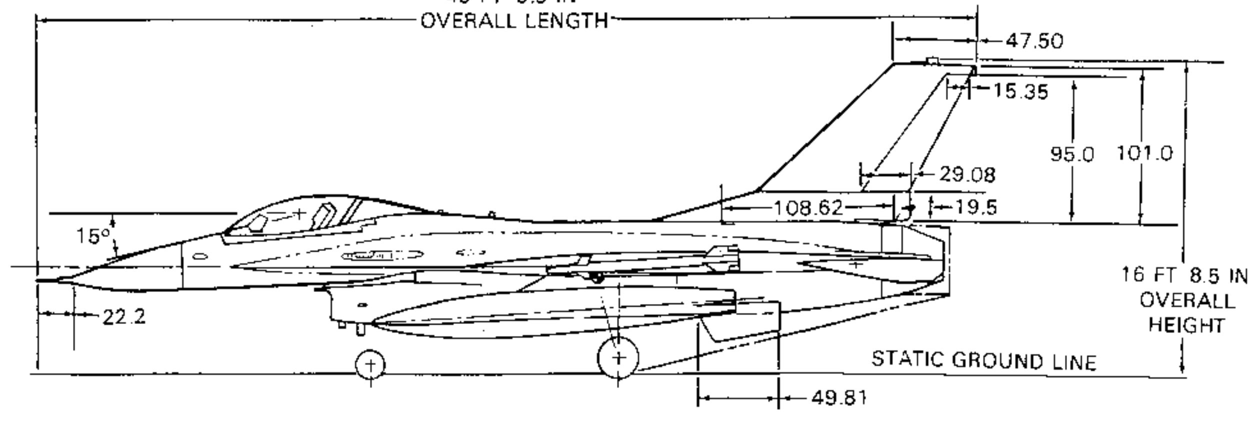
General Data

BLOCK 10

WING	
Area	300 Sq Ft
Span	30 Ft 0 In
Aspect Ratio	3.0
Taper Ratio	0.2275
Sweep (LE)	40°
Dihedral	0°
Airfoil	NACA 64A204
Incidence	0°
Twist	
At SS 54.0	0°
At SS 180.0	3°
Flaperon Area	31.32 Sq Ft
LEF Area	36.71 Sq Ft
HORIZONTAL TAIL (MOVABLE)	
Area	49.0 Sq Ft
Aspect Ratio	2.598
Taper Ratio	0.3
Sweep (LE)	40°
Dihedral	-10°
Airfoil	
At Root	6% Biconvex
At Tip	3.5 Biconvex
VERTICAL TAIL	
Area	54.75 Sq Ft
Aspect Ratio	1.294
Taper Ratio	0.437
Sweep (LE)	47.5°
Airfoil	
At Root	5.3% Biconvex
At Tip	3.0% Biconvex
Rudder Area	11.65 Sq Ft
VENTRAL FIN (EACH)	
Area	8.03 Sq Ft
Span	23.356 In Theo (27.5 In Actual)
Aspect Ratio	0.472 (Theo)
Taper Ratio	0.760 (Theo)
Sweep (LE)	30°
Dihedral (Cant)	15° Outbd
Airfoil	
At Root	3.886% Modified Wedge
At Tip	Constant 0.03R
SPEEDBRAKE	
Area (4 Element Clamshell)	14.26 Sq Ft (3.565 Sq Ft Ea)
LANDING GEAR (LG)	
Main Gear (MLG)	
Tire Size	25.5 x 8-14
Stroke	10.5 In
Static Rolling Radius	11.0 In
Nose Gear (NLG)	
Tire Size	18 x 5.5-8
Stroke	10.0 In
Static Rolling Radius	7.5 In
PROPULSION	
Engine	F-100-PW-200
Thrust	25,000 Lb Class
Engine Compressor	
Face Dia	34.8 In
Engine Length	191.16 In

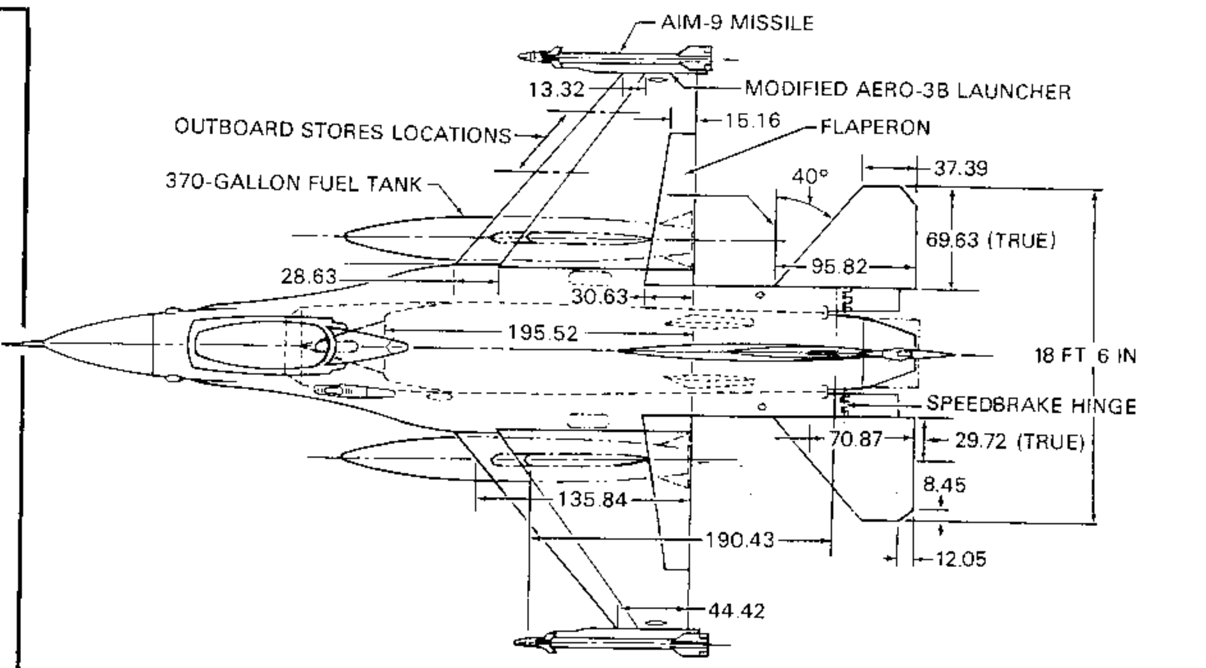


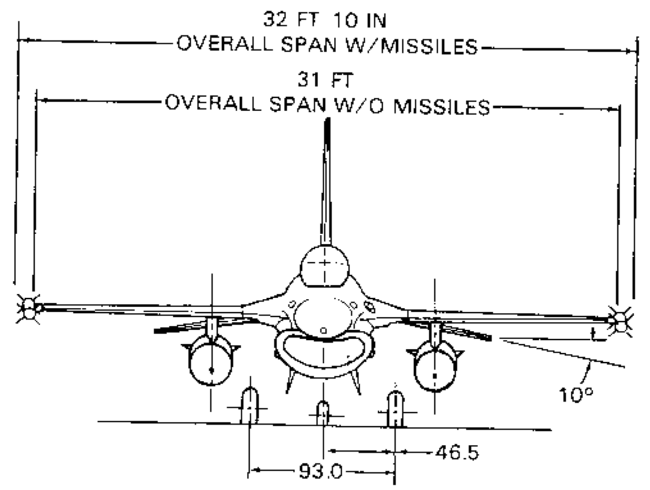




BLOCK 15

WING	
Area	300 Sq Ft
Span	30 Ft 0 In
Aspect Ratio	3.0
Taper Ratio	0.2275
Sweep (LE)	40°
Dihedral	0°
Airfoil	NACA 64A204
Incidence	0°
Twist	
At SS 54.0	0°
At SS 180.0	3°
Flaperon Area	31.32 Sq Ft
LEF Area	36.71 Sq Ft
HORIZONTAL TAIL (MOVABLE)	
Area	63.70 Sq Ft
Aspect Ratio	2.114
Taper Ratio	0.390 (Theo)
Sweep (L E)	40°
Dihedral	-10°
Airfoil	
At Root	6% Biconvex
At Tip	3.5 Biconvex
VERTICAL TAIL	
Area	54.75 Sq Ft
Aspect Ratio	1.294
Taper Ratio	0.437
Sweep (LE)	47.5°
Airfoil	
At Root	5.3% Biconvex
At Tip	3.0% Biconvex
Rudder Area	11.65 Sq Ft
VENTRAL FIN (EACH)	
Area	8.03 Sq Ft
Span	23.356 In Theo (27.5 In Actual)
Aspect Ratio	0.472 (Theo)
Taper Ratio	0.760 (Theo)
Sweep (LE)	30°
Dihedral (Cant)	15° Outbd
Airfoil	
At Root	3.886% Modified Wedge
At Tip	Constant 0.03R
SPEEDBRAKE	
Area (4 Element Clamshell)	14.26 Sq Ft (3.565 Sq Ft Ea)
LANDING GEAR (LG)	
Main Gear (MLG)	
Tire Size	25.5 x 8-14
Stroke	10.5 In
Static Rolling Radius	11.0 In
Nose Gear (NLG)	
Tire Size	18 x 5.5-8
Stroke	10.0 In
Static Rolling Radius	7.5 In
PROPULSION	
Engine	F-100-PW-200
Thrust	25,000 Lb Class
Engine Compressor	
Face Dia	34.8 In
Engine Length	191.16 In





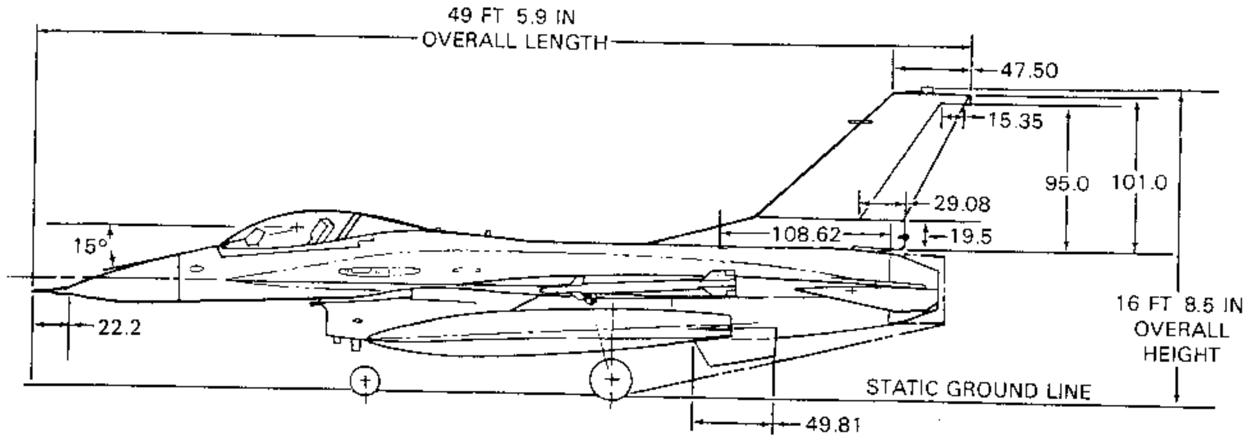


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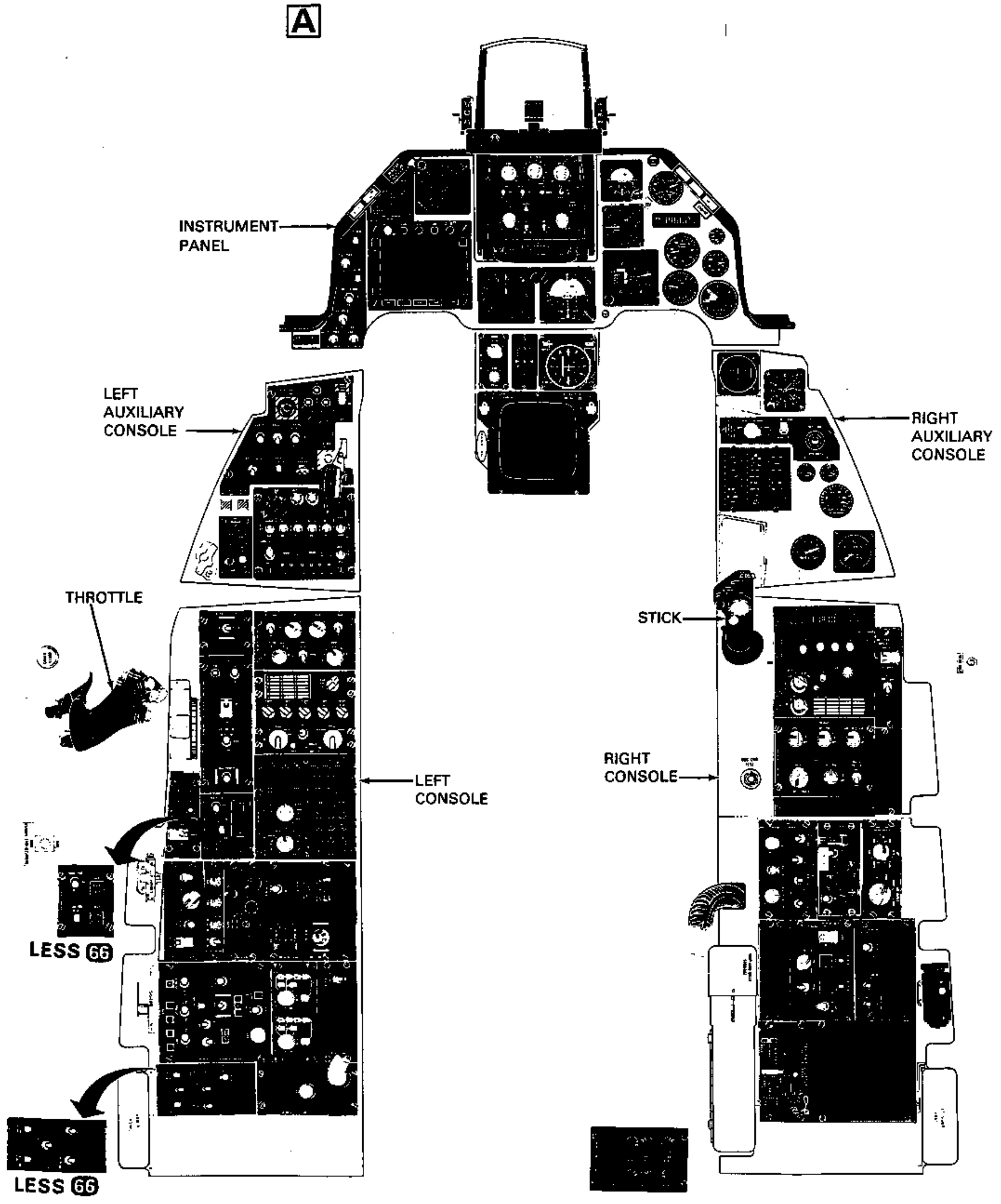
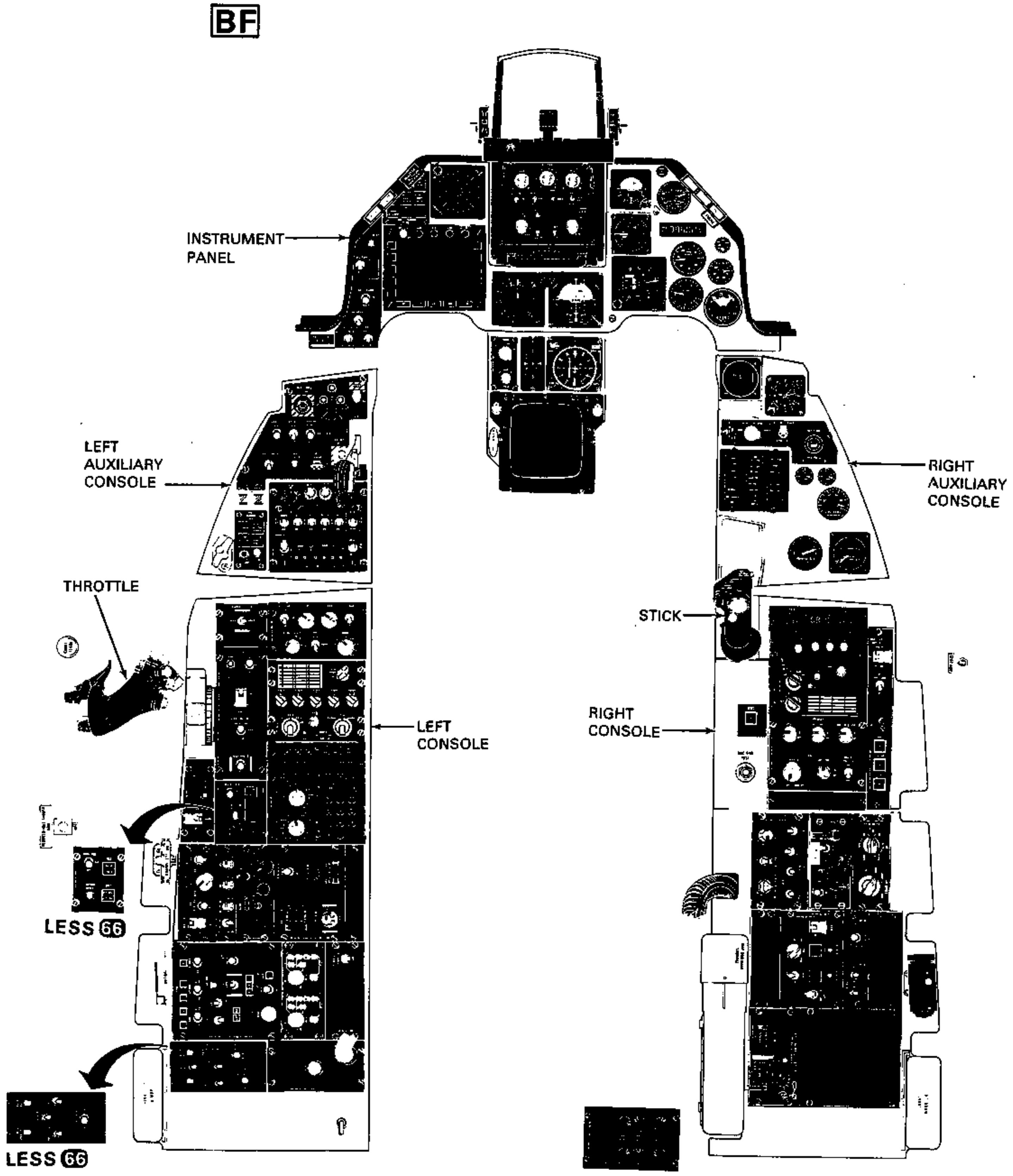
Figure FO-2.

Cockpit Arrangement (Typical)

BLOCK 10





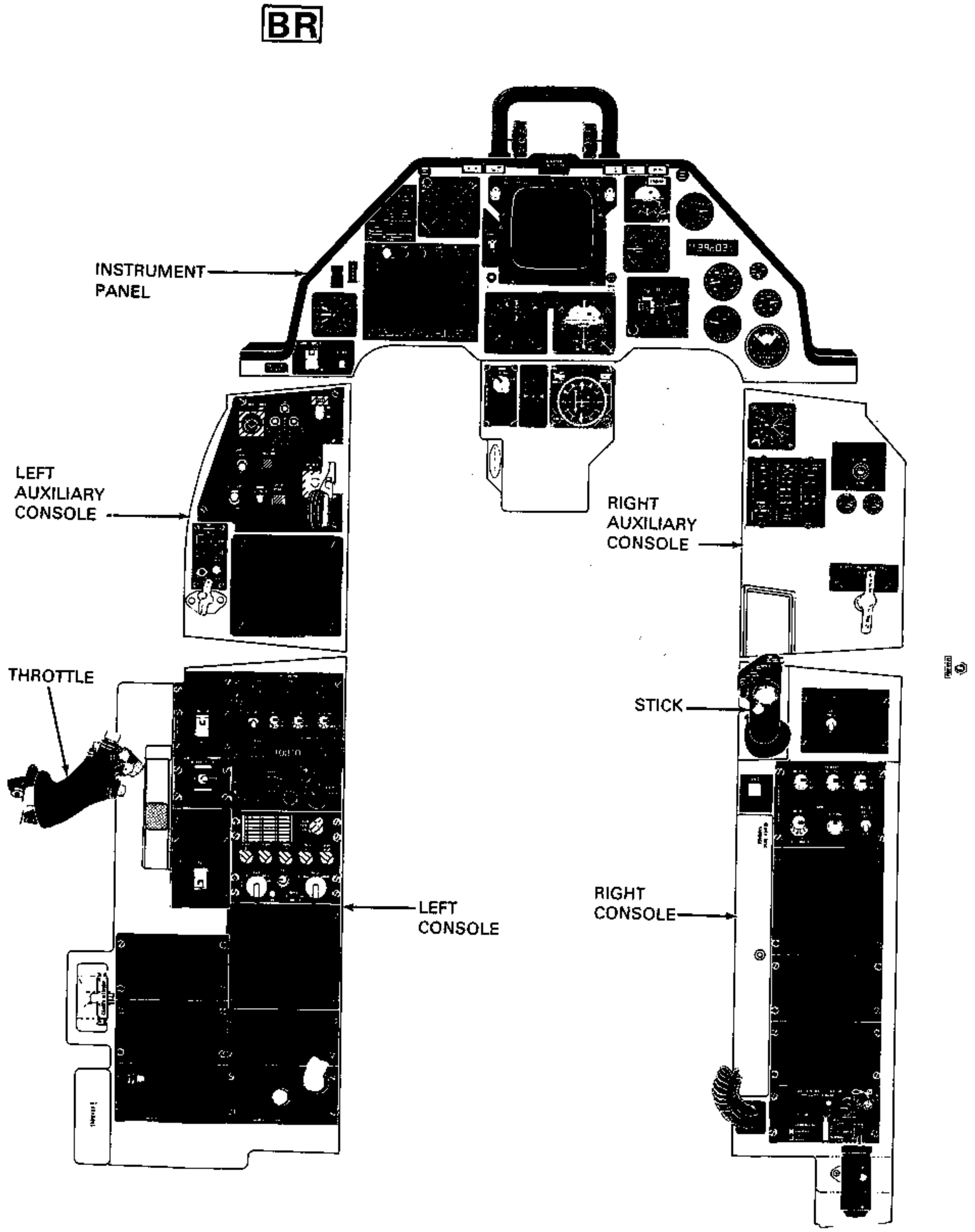


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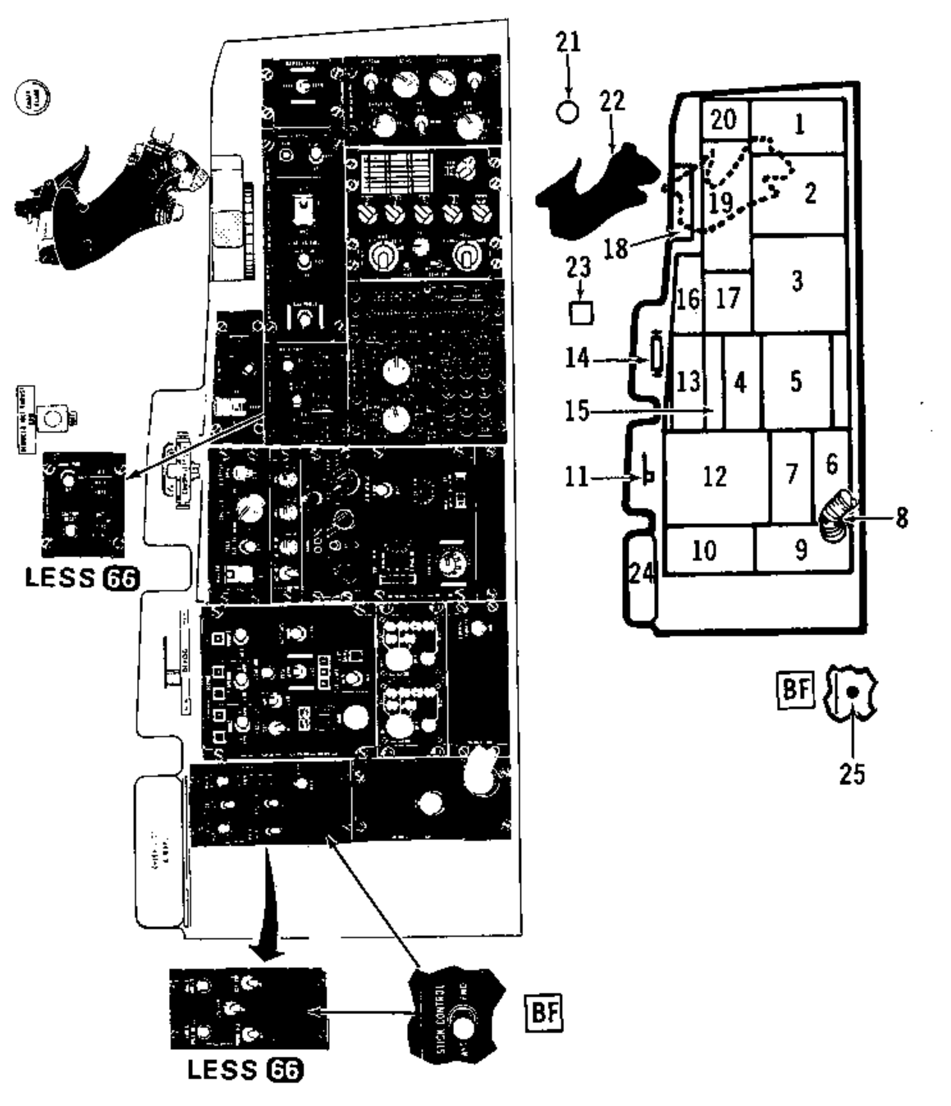
Figure FO-3. (Sheet 1)

Cockpit Arrangement (Typical)

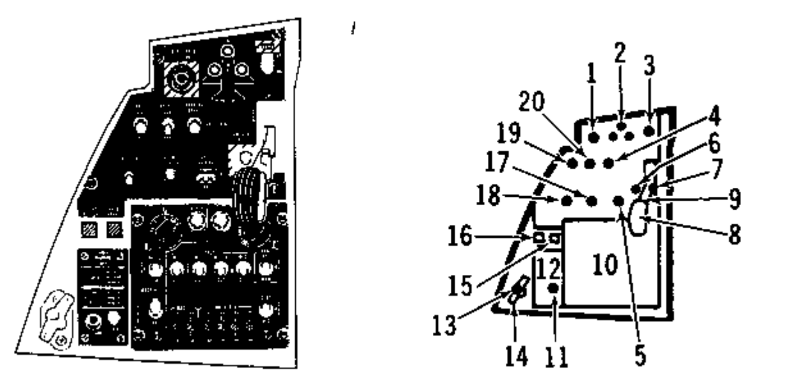
BLOCK 10

LEFT CONSOLE [A] [BF]



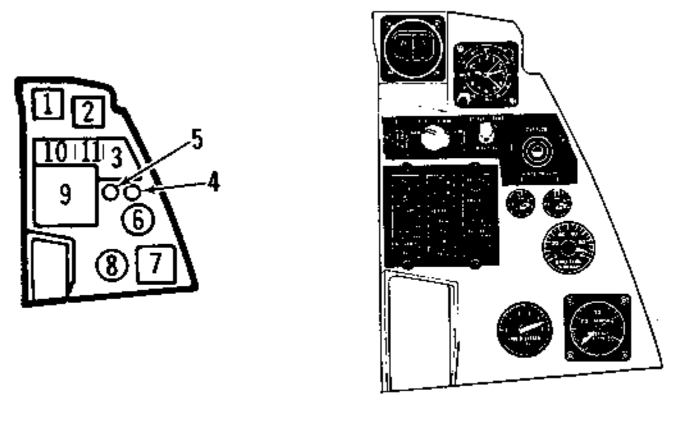
1. Radar Control Panel
2. UHF Radio Control Panel
3. Fire Control Navigation Panel
4. TACAN Control Panel
5. Manual Trim Panel
6. AVTR Control Panel
7. ECM Pod Control Panel
8. Anti-G Suit Hose Connection
9. Anti-G Test Panel
10. Test Switch Panel
11. DEFOG Lever
12. Flight Control Panel
13. Fuel Control Panel
14. CANOPY JETTISON T-Handle
15. Communications Control Panel
16. EPU Control Panel
17. Electrical System Controls
18. Throttle FRICTION Control
19. Engine & Jet Start Control Panel
20. MANUAL PITCH Override Switch
21. CHAFF/FLARE Dispenser Button
22. Throttle
23. REDUCED IDLE THRUST Switch
24. Stowage
25. [BF] STICK CONTROL Select Switch

LEFT AUXILIARY CONSOLE [A] [BF]



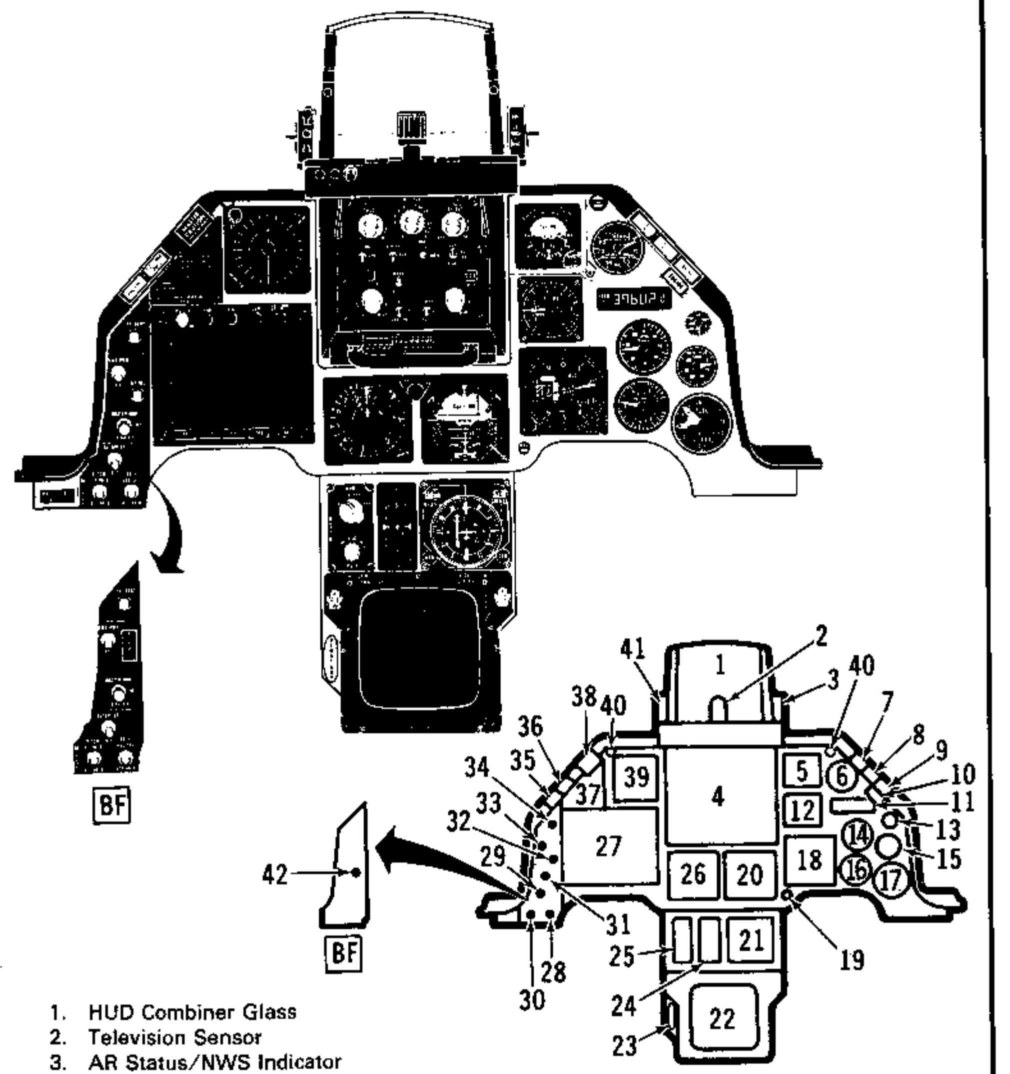
1. EMER STORES JETTISON Button (Covered)
2. WHEELS Down Lights (Green)
3. HOOK Switch (Lever Lock)
4. PARKING BRAKE Switch
5. LANDING TAXI Lights Switch
6. LG Handle Downlock Release (DN LOCK REL) Button
7. LG Handle Down Permission Button
8. LG Handle Warning Light (Red)
9. LG Handle
10. IFF Control Panel
11. THREAT WARNING AUX (DIM) Control Knob
12. THREAT WARNING AUX Controls and Indicators
13. ALT GEAR Reset Button
14. ALT GEAR Down Actuation Handle
15. SPEEDBRAKE Position Indicator
16. LE FLAP POSITION Indicator
17. HORN SILENCER Button
18. STORES CONFIG Switch
19. GND JETT ENABLE Switch
20. BRAKES Channel Switch

RIGHT AUXILIARY CONSOLE [A] [BF]



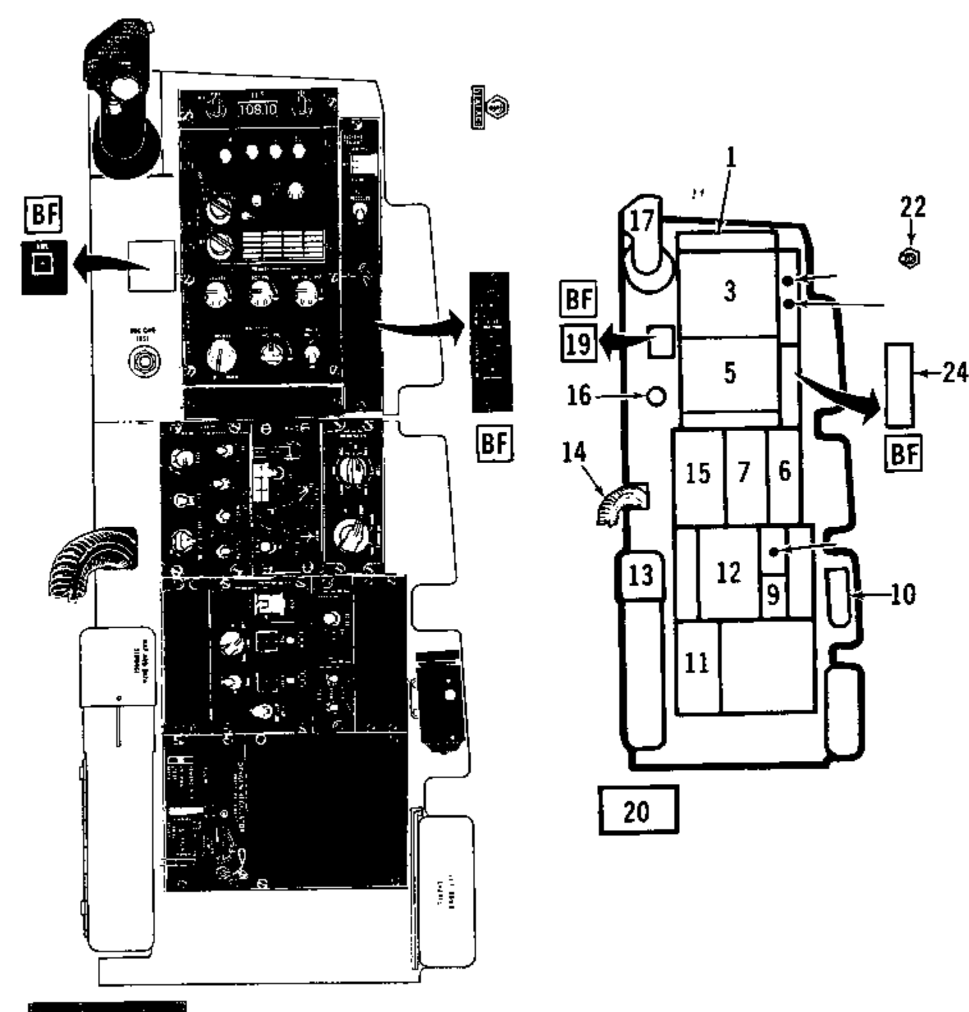
1. Standby Magnetic Compass
2. Clock
3. Oxygen Flow Indicator
4. System B Hydraulic Pressure Indicator
5. System A Hydraulic Pressure Indicator
6. EPU Fuel Quantity Indicator
7. Cockpit Pressure Altimeter
8. Liquid Oxygen Quantity Indicator
9. Caution Light Panel
10. FUEL QTY SEL Knob
11. EXT FUEL TRANS Switch

INSTRUMENT PANEL [A] [BF]



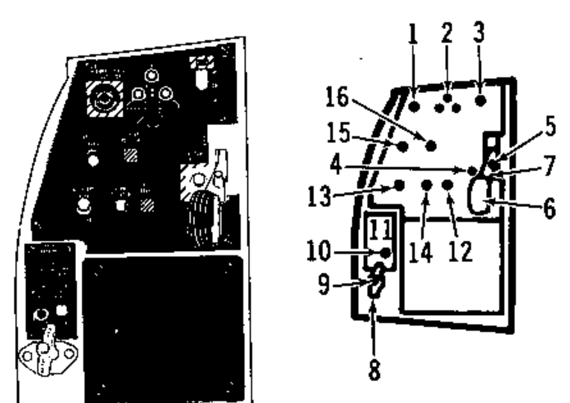
1. HUD Combiner Glass
2. Television Sensor
3. AR Status/NWS Indicator
4. HUD Control Panel
5. Standby Attitude Indicator
6. Fuel Flow Indicator
7. DUAL FC FAIL Warning Light (Red)
8. HYD/OIL PRESS Warning Light (Red)
9. CANOPY Warning Light (Red)
10. ENGINE Warning Light (Red)
11. Radio Channel/Frequency Indicator
12. Vertical Velocity Indicator
13. Oil Pressure Indicator
14. RPM Indicator
15. Nozzle Position Indicator
16. FTIT Indicator
17. Fuel Quantity Indicator
18. Altimeter
19. MRK BCN Light
20. Attitude Director Indicator
21. Horizontal Situation Indicator
22. Radar/EO Display
23. Rudder PEDAL ADJ Knob
24. AOA Indicator
25. Instrument Mode Select Panel
26. Airspeed Mach Indicator
27. Stores Control Panel
28. Autopilot ROLL Switch
29. AUTOPILOT Switch
30. Autopilot PITCH Switch
31. MASTER ARM Switch
32. ALT REL Button
33. SMS PWR Switch
34. IFF IDENT Button
35. ENG FIRE Warning Light (Red)
36. T.O./LAND CONFIG Warning Light (Red)
37. THREAT WARNING Controls and Indicators
38. MASTER CAUTION Light (Amber)
39. THREAT WARNING Azimuth Indicator
40. Spotlight
41. AOA Indexer
42. [BF] OVRD Light

RIGHT CONSOLE [A] [BF]



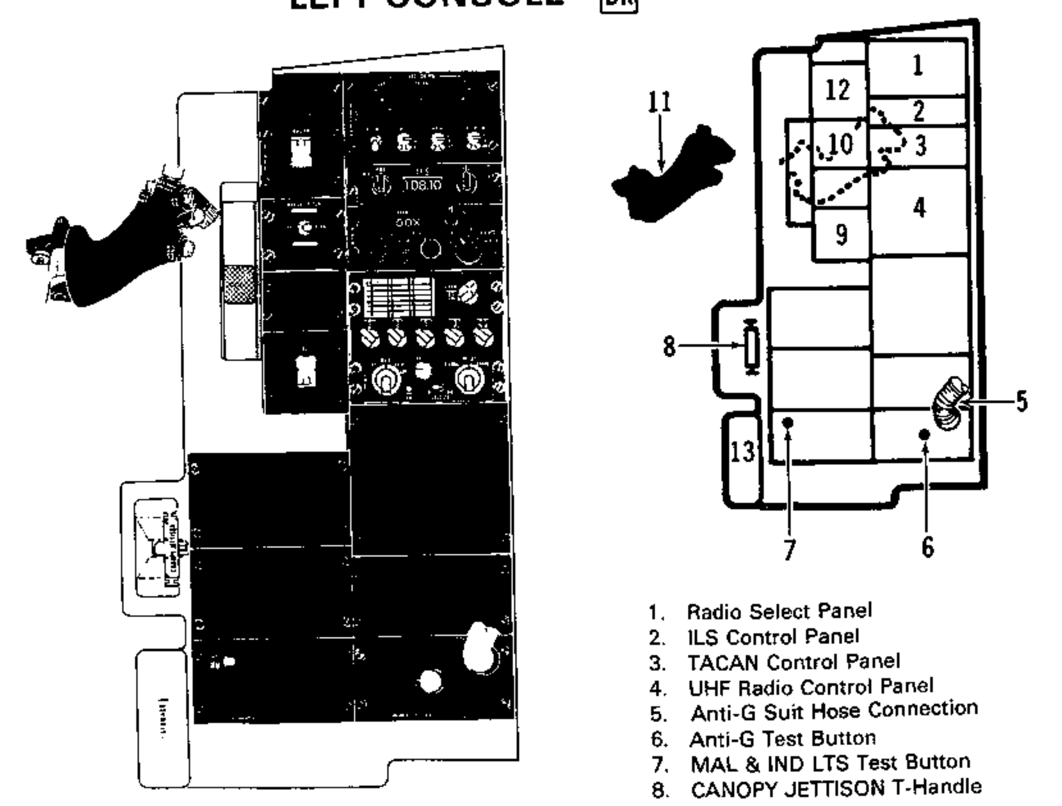
1. ILS Control Panel
2. NUCLEAR CONSENT Switch (Guarded)
3. VHF Radio Control Panel
4. SUIT PRESSURE Vent Switch
5. Interior Lighting Control Panel
6. ECS Control Panel
7. Secure Voice Panel
8. ENGINE ANTI ICE Switch
9. Antenna Select Panel
10. Utility Light
11. Oxygen Regulator Panel
12. CHAFF/FLARE Control Panel
13. Stowage
14. Oxygen/Communications Hookup
15. Exterior Lighting Control Panel
16. BUC GND TEST Button
17. Stick
18. [BF] Radio Control Panel
19. [BF] NWS Control Button/Indicator
20. Chaff/Flare Programmer
21. SEAT ADJ Switch

LEFT AUXILIARY CONSOLE [BR]



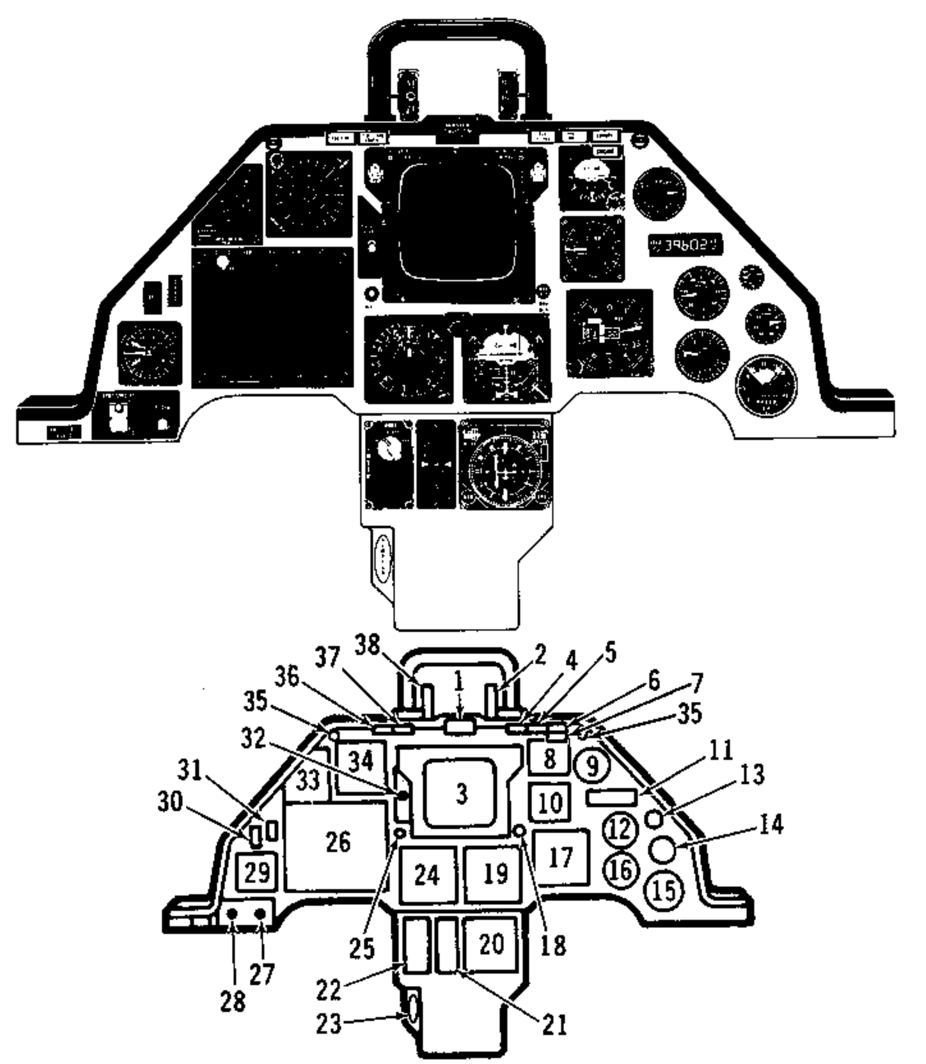
1. EMER STORES JETTISON Button (Covered)
2. WHEELS Down Lights (Green)
3. HOOK Switch (Lever Lock)
4. LG Handle Downlock Release (DN LOCK REL) Button
5. LG Handle Down Permission Button
6. LG Handle Warning Light (Red)
7. LG Handle
8. ALT GEAR Handle
9. ALT GEAR Reset Button
10. THREAT WARNING AUX (DIM) Control Knob
11. THREAT WARNING AUX Controls and Indicators
12. Speedbrakes Position Indicator
13. ALT FLAPS Switch (Lever Lock)
14. HORN SILENCER Button
15. GND JETT ENABLE Switch (Lever Lock)
16. LE FLAP POSITION Indicator

LEFT CONSOLE [BR]



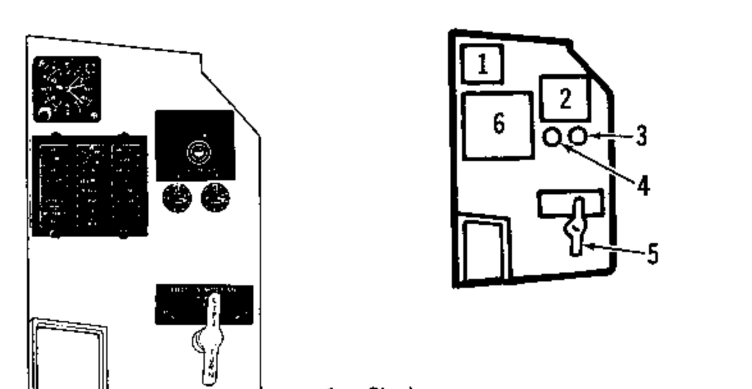
1. Radio Select Panel
2. ILS Control Panel
3. TACAN Control Panel
4. UHF Radio Control Panel
5. Anti-G Suit Hose Connection
6. Anti-G Test Button
7. MAL & IND LTS Test Button
8. CANOPY JETTISON T-Handle
9. BUC Switch
10. MANUAL PITCH Override Switch
11. Throttle
12. FUEL MASTER Switch
13. Stowage

INSTRUMENT PANEL [BR]



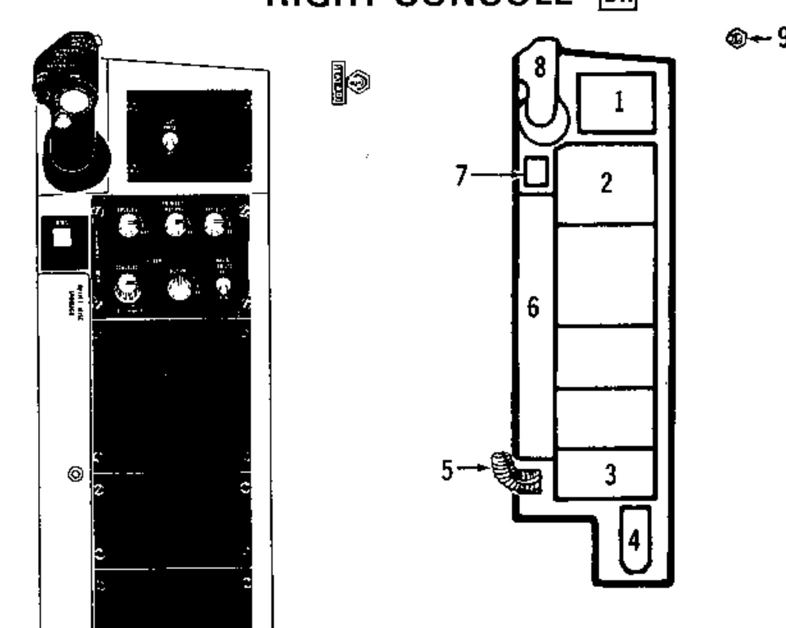
1. MASTER CAUTION Light (Amber)
2. AR Status/NWS Indicator
3. Radar/EO Display
4. DUAL FC FAIL Warning Light (Red)
5. HYD/OIL PRESS Warning Light (Red)
6. CANOPY Warning Light (Red)
7. ENGINE Warning Light (Red)
8. Standby Attitude Indicator
9. Fuel Flow Indicator
10. Vertical Velocity Indicator
11. Radio Channel/Frequency Indicator
12. RPM Indicator
13. Oil Pressure Indicator
14. Nozzle Position Indicator
15. Fuel Quantity Indicator
16. FTIT Indicator
17. Altimeter
18. MRK BCN Light
19. Attitude Director Indicator
20. Horizontal Situation Indicator
21. AOA Indicator
22. Instrument Mode Select Panel
23. Rudder PEDAL ADJ Knob
24. Airspeed Mach Indicator
25. Reduced Idle Thrust Indicator
26. Stores Control Panel
27. IFF IDENT Button
28. ARMT CONSENT Switch (Guarded)
29. Accelerometer
30. Stick Selector Indicator
31. OVRD Light
32. VIDEO SEL Switch
33. THREAT WARNING Controls & Indicators
34. THREAT WARNING Azimuth Indicator
35. Spotlight
36. ENG FIRE Warning Light (Red)
37. T.O./LAND CONFIG Warning Light (Red)
38. AOA Indexer

RIGHT AUXILIARY CONSOLE [BR]



1. Clock
2. Oxygen Flow Indicator
3. System B Hydraulic Pressure Indicator
4. System A Hydraulic Pressure Indicator
5. EJECTION MODE SEL Handle
6. Caution Light Panel

RIGHT CONSOLE [BR]



1. SUIT PRESS Vent Switch
2. Interior Lighting Control Panel
3. Oxygen Regulator Panel
4. Utility Light
5. Oxygen/Communications Hookup
6. Stowage
7. NWS Control Button Indicator
8. Stick
9. SEAT ADJ Switch

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Figure FO-3. (Sheet 2)

Cockpit Arrangement (Typical)

BLOCK 15

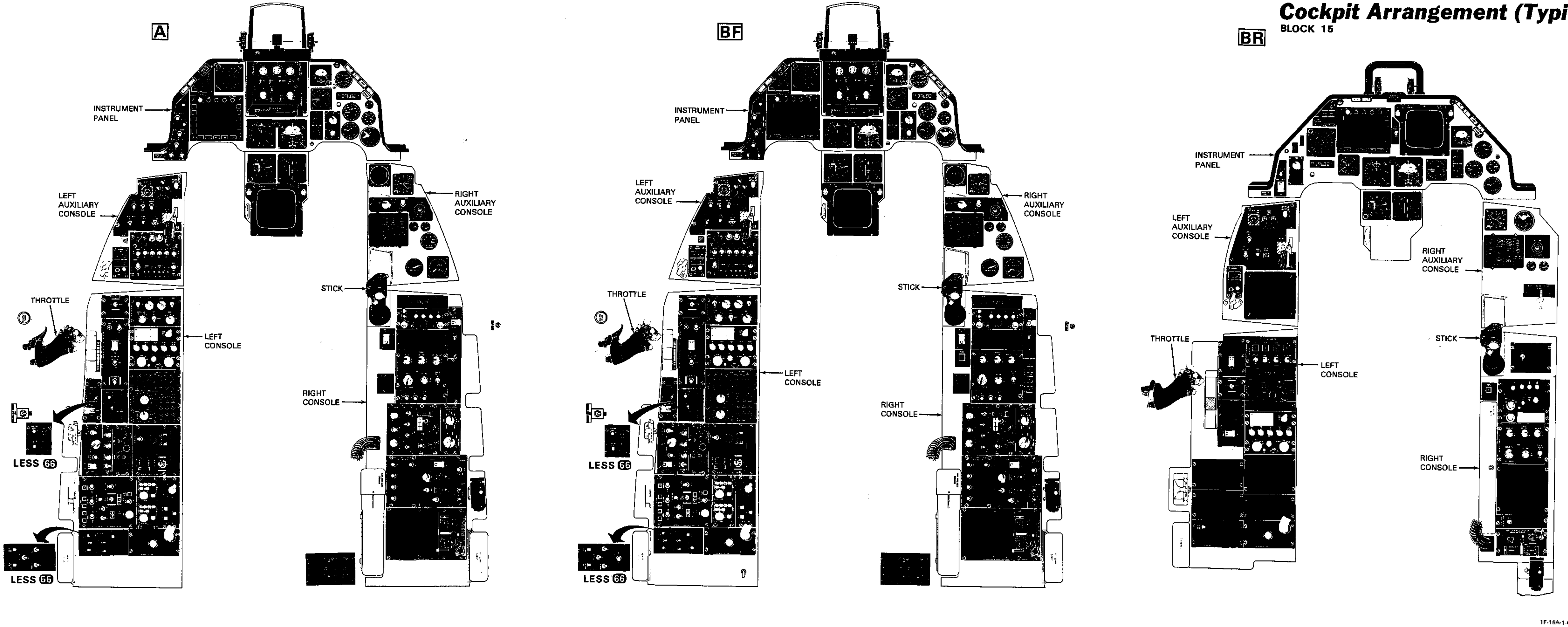
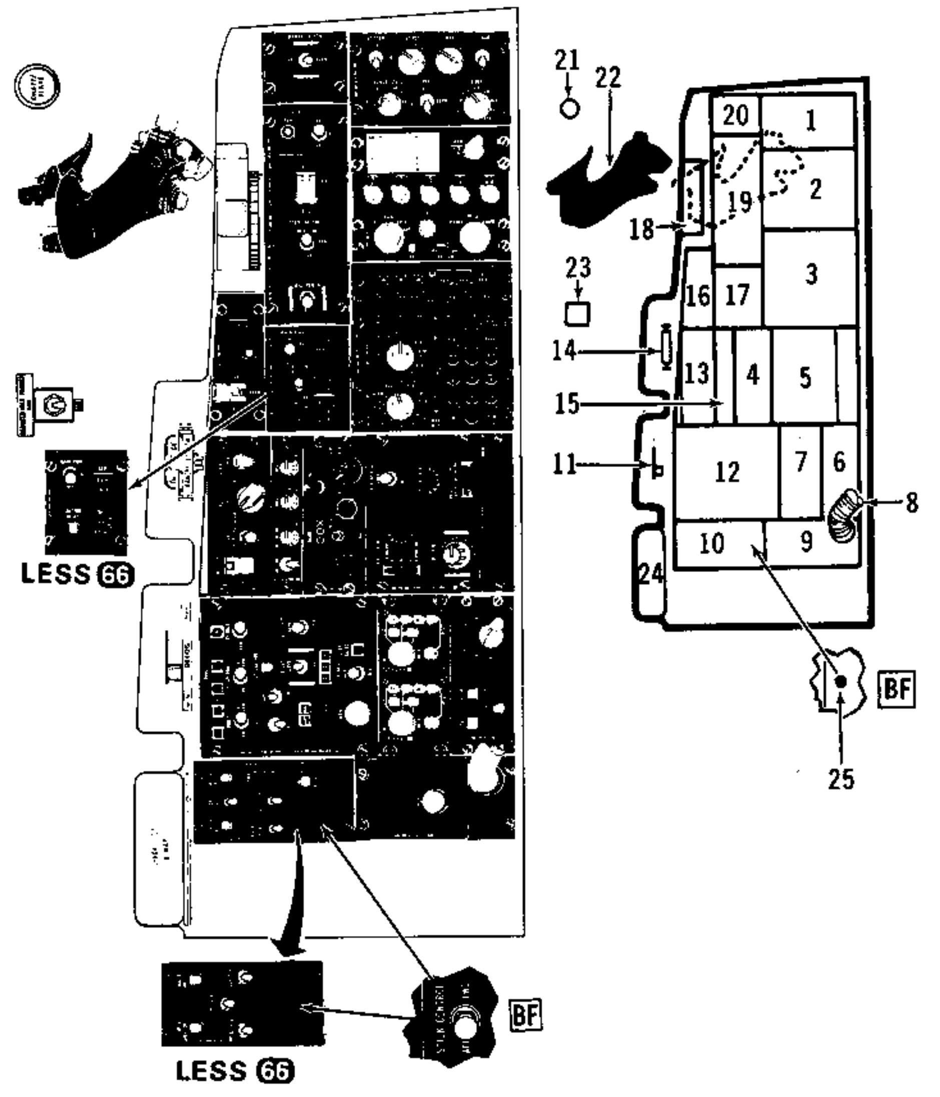


Figure FO-3. (Sheet 3)

Cockpit Arrangement (Typical)

BLOCK 15

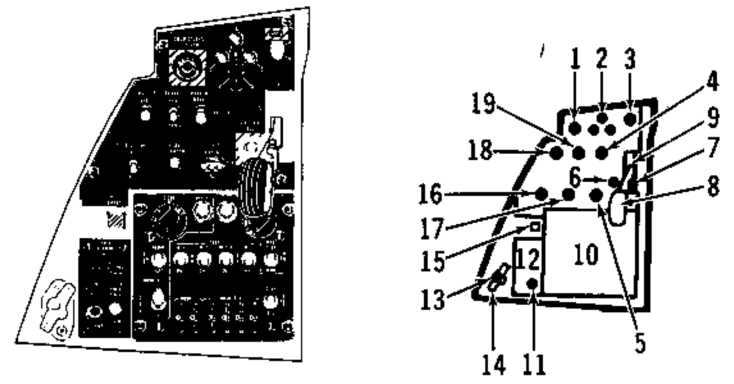
LEFT CONSOLE A BF



LESS 66

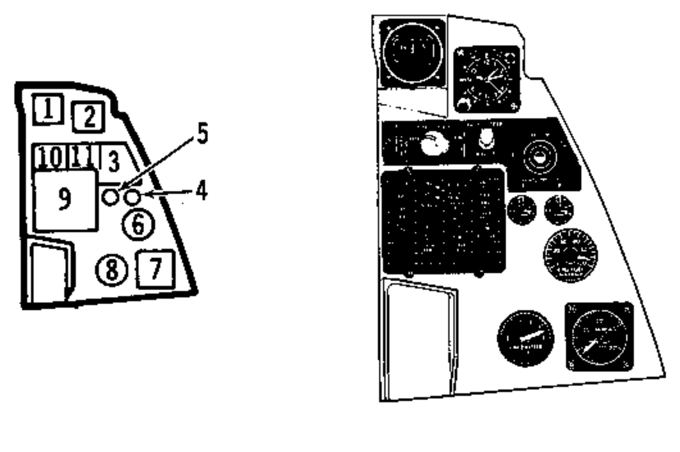
1. Radar Control Panel
2. UHF Radio Control Panel
3. Fire Control Navigation Panel
4. TACAN Control Panel
5. Manual Trim Panel
6. AVTR Control Panel
7. ECM Pod Control Panel
8. Anti-G Suit Hose Connection
9. Anti-G Test Panel
10. Test Switch Panel
11. DEFOG Lever
12. Flight Control Panel
13. Fuel Control Panel
14. CANOPY JETTISON T-Handle
15. Communications Control Panel
16. EPU Control Panel
17. Electrical System Controls
18. Throttle FRICTION Control
19. Engine & Jet Start Control Panel
20. MANUAL PITCH Override Switch
21. CHAFF/FLARE Dispenser Button
22. Throttle
23. REDUCED IDLE THRUST Switch
24. Stowage
25. BF STICK CONTROL Select Switch

LEFT AUXILIARY CONSOLE A BF



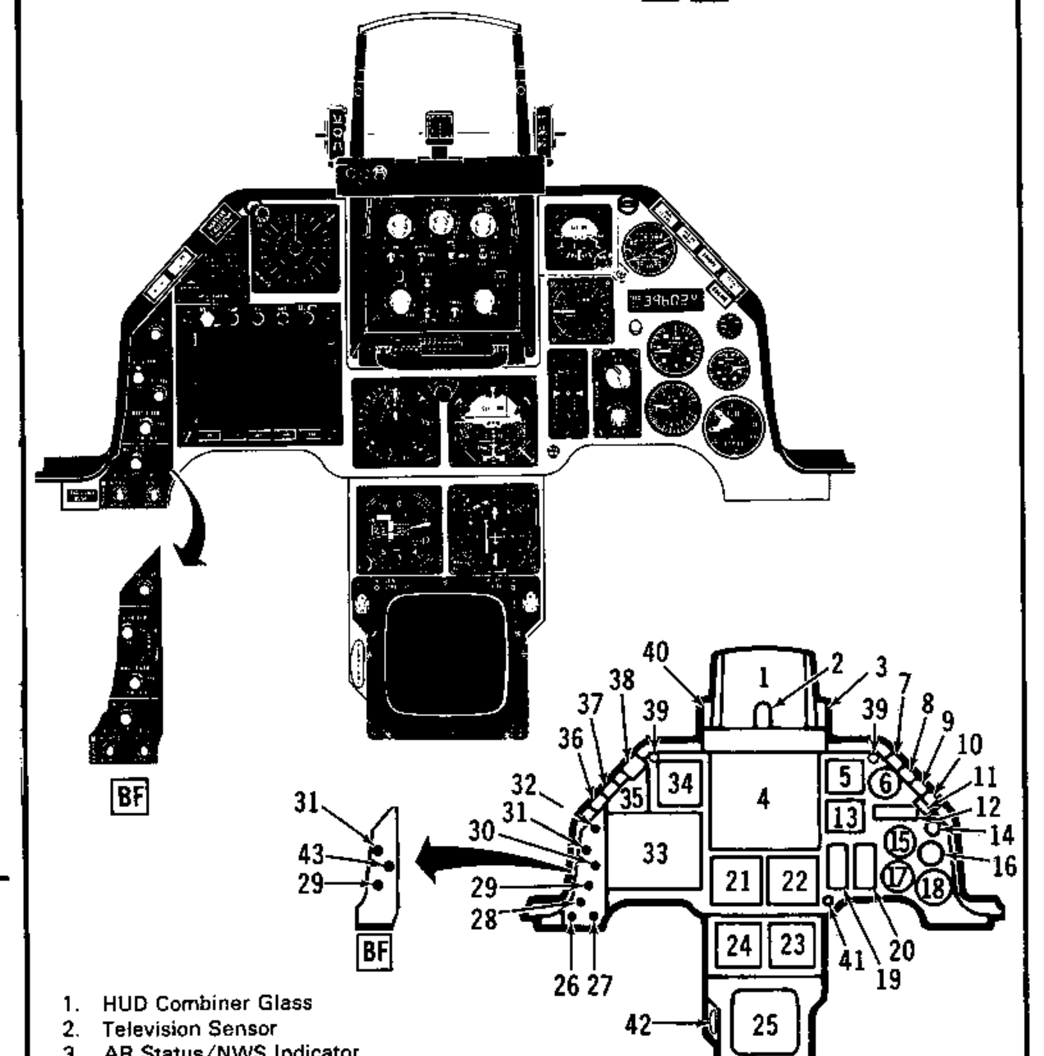
1. EMER STORES JETTISON Button (Covered)
2. WHEELS Down Lights (Green)
3. HOOK Switch (Lever Lock)
4. PARKING BRAKE Switch
5. LANDING TAXI Lights Switch
6. LG Handle Downlock Release (DN LOCK REL) Button
7. LG Handle Down Permission Button
8. LG Handle Warning Light (Red)
9. LG Handle
10. IFF Control Panel
11. THREAT WARNING AUX (DIM) Control Knob
12. THREAT WARNING AUX Controls and Indicators
13. ALT GEAR Reset Button
14. ALT GEAR Down Actuation Handle
15. SPEEDBRAKE Position Indicator
16. STORES CONFIG Switch
17. HORN SILENCER Button
18. GND JETT ENABLE Switch
19. BRAKES Channel Switch

RIGHT AUXILIARY CONSOLE A BF



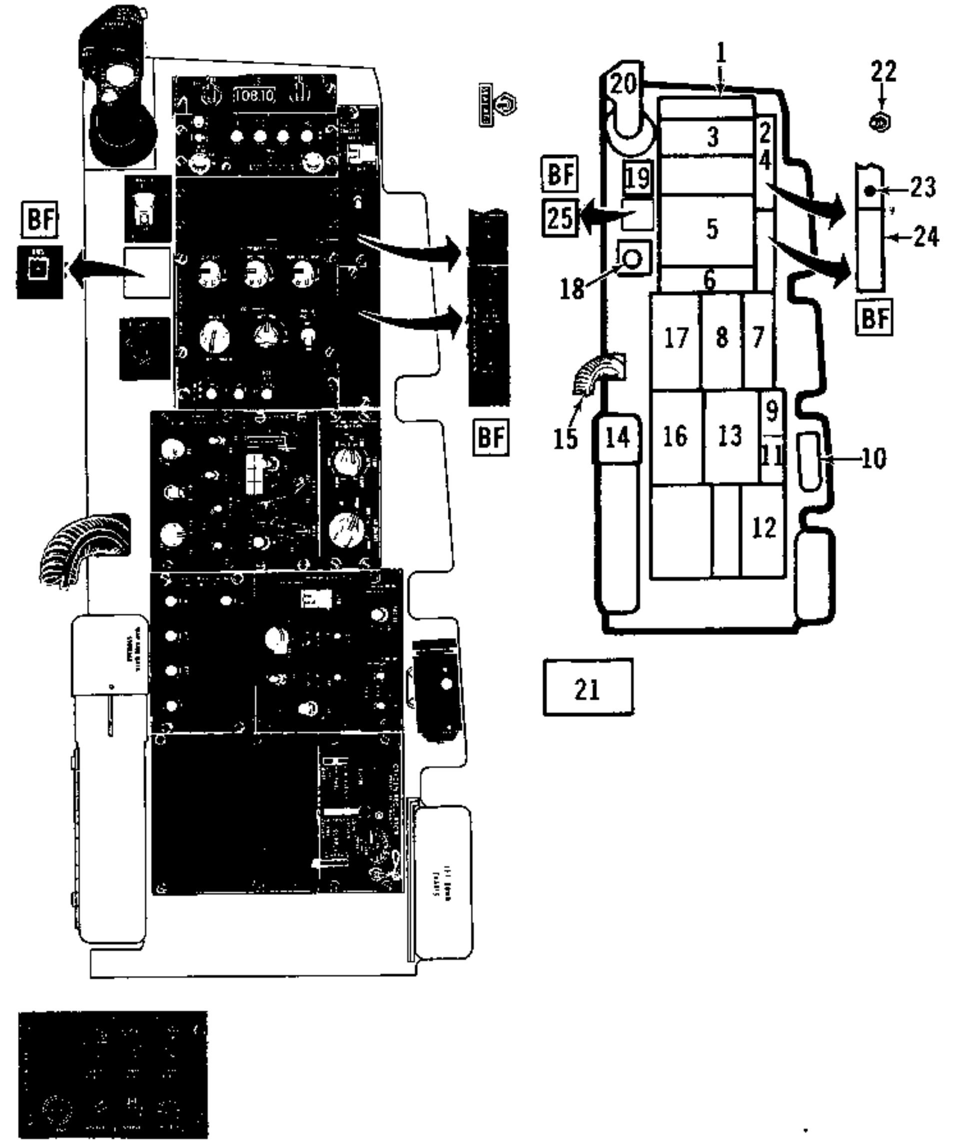
1. Magnetic Compass
2. Clock
3. Oxygen Flow Indicator
4. System B Hydraulic Pressure Indicator
5. System A Hydraulic Pressure Indicator
6. EPU Fuel Quantity Indicator
7. Cockpit Pressure Altimeter
8. Liquid Oxygen Quantity Indicator
9. Caution Light Panel
10. FUEL QTY SEL Knob
11. EXT FUEL TRANS Switch

INSTRUMENT PANEL A BF



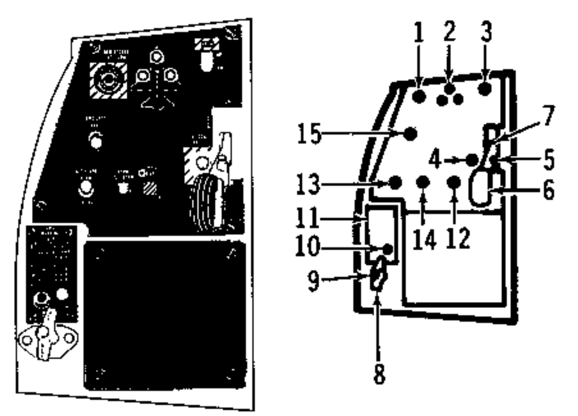
1. HUD Combiner Glass
2. Television Sensor
3. AR Status/NWS Indicator
4. HUD Control Panel
5. Standby Attitude Indicator
6. Fuel Flow Indicator
7. DUAL FC FAIL Warning Light (Red)
8. HYD/OIL PRESS Warning Light (Red)
9. CANOPY Warning Light (Red)
10. RDR ALT LOW Warning Light (Red)
11. ENGINE Warning Light (Red)
12. Radio Channel/Frequency Indicator
13. Vertical Velocity Indicator
14. Oil Pressure Indicator
15. RPM Indicator
16. Nozzle Position Indicator
17. FTIT Indicator
18. Fuel Quantity Indicator
19. AOA Indicator
20. Instrument Mode Select Panel
21. Airspeed Mach Indicator
22. Attitude Director Indicator
23. Horizontal Situation Indicator
24. Altimeter
25. Radar/EO Display
26. Autopilot PITCH Switch
27. Autopilot ROLL Switch
28. AUTOPILOT Switch
29. MASTER ARM Switch
30. ALT REL Button
31. LASER ARM Switch
32. IFF IDENT Button
33. Stores Control Panel
34. Threat Warning Azimuth Indicator
35. THREAT WARNING Controls and Indicators
36. ENG FIRE Warning Light (Red)
37. T.O./LAND CONFIG Warning Light (Red)
38. MASTER CAUTION Light (Amber)
39. Spotlight
40. AOA Indexer
41. MRK BCN Light
42. Rudder PEDAL ADJ Knob
43. BF OVRD Light

RIGHT CONSOLE A BF



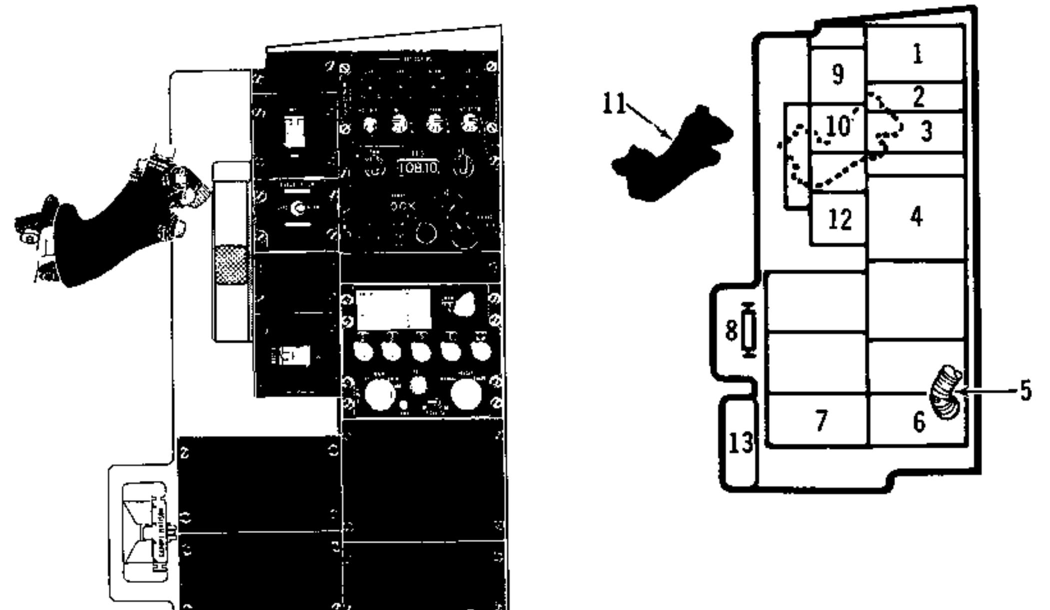
1. ILS Control Panel
2. NUCLEAR CONSENT Switch (Guarded)
3. VHF Radio Control Panel
4. SUIT PRESS Vent Switch
5. Interior Lighting Control Panel
6. SNSR Power Control Panel
7. ECS Control Panel
8. Secure Voice Panel
9. ENGINE ANTI ICE Switch
10. Utility Light
11. Antenna Select Panel
12. Oxygen Regulator Panel
13. Chaff/Flare Control Panel
14. Stowage
15. Oxygen/Communications Hookup
16. Avionics Power Panel
17. Exterior Lighting Control Panel
18. BUC GND TEST Button
19. MASTER ZEROIZE Switch
20. Stick
21. Chaff/Flare Programmer
22. SEAT ADJ Switch
23. BF VHF Control Button Indicator
24. BF Radio Control Panel
25. BF NWS Control Button Indicator

LEFT AUXILIARY CONSOLE BR



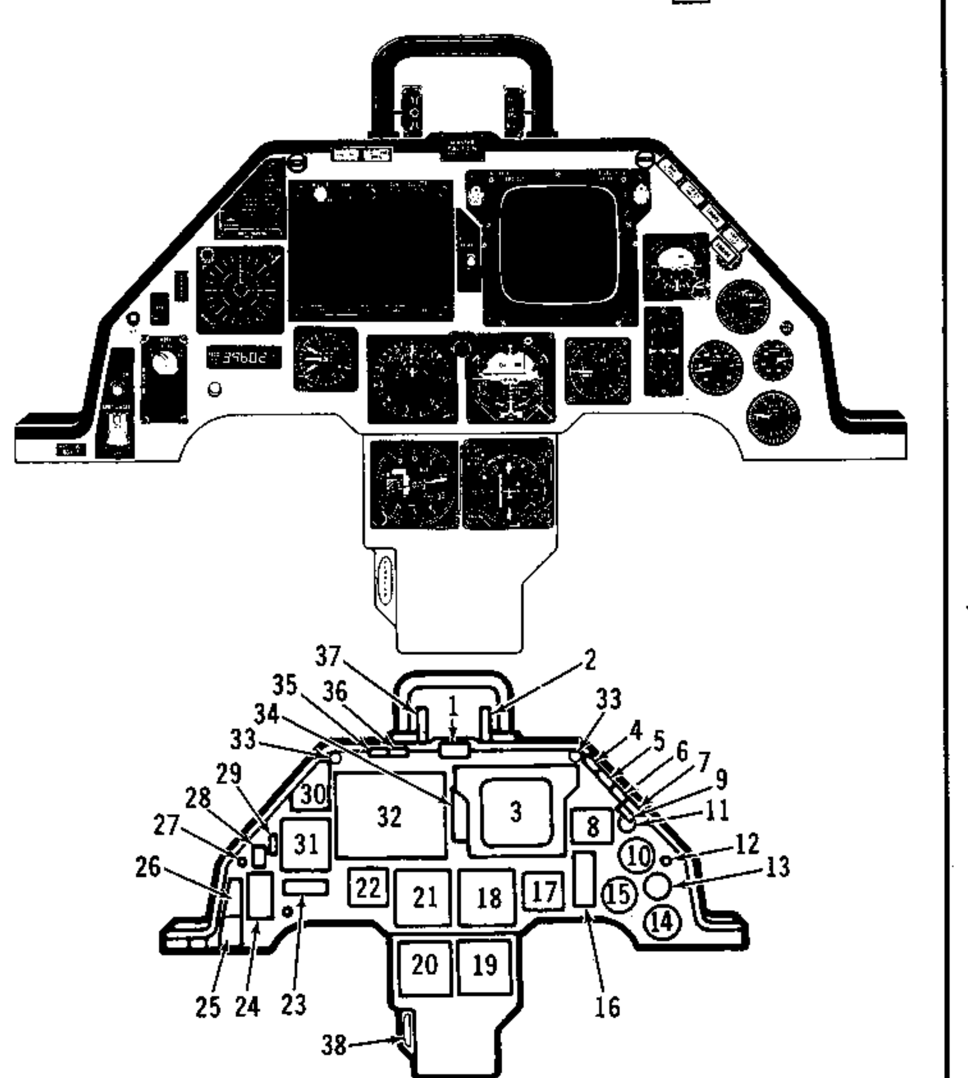
1. EMER STORES JETTISON Button (Covered)
2. WHEELS Down Lights (Green)
3. HOOK Switch (Lever Lock)
4. LG Handle Downlock Release (DN LOCK REL) Button
5. LG Handle Down Permission Button
6. LG Handle Warning Light (Red)
7. LG Handle
8. ALT GEAR Handle
9. ALT GEAR Reset Button
10. THREAT WARNING AUX (DIM) Control Knob
11. THREAT WARNING AUX Controls and Indicators
12. Speedbrake Position Indicator
13. ALT FLAPS Switch (Lever Lock)
14. HORN SILENCER Button
15. GND JETT ENABLE Switch (Lever Lock)

LEFT CONSOLE BR



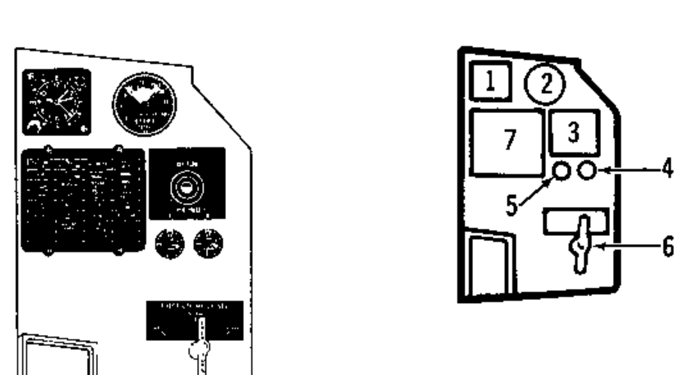
1. Radio Select Panel
2. ILS Control Panel
3. TACAN Control Panel
4. UHF Radio Control Panel
5. Anti-G Suit Hose Connection
6. Anti-G Test Button
7. MAL & IND LTS Test Button
8. CANOPY JETTISON T-Handle
9. BUC Switch
10. MANUAL PITCH Override Switch
11. Throttle
12. FUEL MASTER Switch
13. Stowage

INSTRUMENT PANEL BR



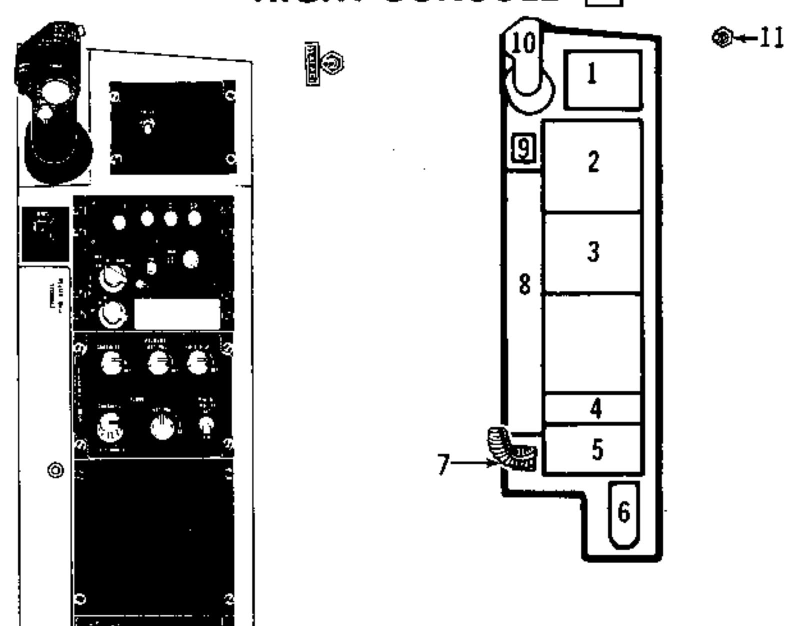
1. MASTER CAUTION Light (Amber)
2. AR Status/NWS Indicator
3. Radar/EO Display
4. DUAL FC FAIL Warning Light (Red)
5. HYD/OIL PRESS Warning Light (Red)
6. CANOPY Warning Light (Red)
7. RDR ALT LOW Warning Light (Red)
8. Standby Attitude Indicator
9. ENGINE Warning Light (Red)
10. Fuel Flow Indicator
11. Oil Pressure Indicator
12. MRK BCN Light
13. Nozzle Position Indicator
14. FTIT Indicator
15. RPM Indicator
16. AOA Indicator
17. Vertical Velocity Indicator
18. Attitude Director Indicator
19. Horizontal Situation Indicator
20. Altimeter
21. Airspeed Mach Indicator
22. Accelerometer
23. Radio Channel/Frequency Indicator
24. Instrument Mode Select Panel
25. ARMT CONSENT Switch (Guarded)
26. IFF IDENT Button
27. Reduced Idle Thrust Indicator
28. Stick Selector Indicator
29. OVRD Light
30. THREAT WARNING Controls & Indicators
31. Threat Warning Azimuth Indicator
32. Stores Control Panel
33. Spotlight
34. VIDEO SEL Switch
35. ENG FIRE Warning Light (Red)
36. T.O./LAND CONFIG Warning Light (Red)
37. AOA Indexer
38. Rudder PEDAL ADJ Knob

RIGHT AUXILIARY CONSOLE BR



1. Clock
2. Fuel Quantity Indicator
3. Oxygen Flow Indicator
4. System B Hydraulic Pressure Indicator
5. System A Hydraulic Pressure Indicator
6. EJECTION MODE SEL Handle
7. Caution Light Panel

RIGHT CONSOLE BR



1. SUIT PRESS Vent Switch
2. VHF Radio Control Panel
3. Interior Lighting Control Panel
4. DSPL POWER Switch
5. Oxygen Regulator Panel
6. Utility Light
7. Oxygen/Communications Hookup
8. Stowage
9. NWS Control Button Indicator
10. Stick
11. SEAT ADJ Switch

1F-16A-1-0451

Figure FO-3. (Sheet 4)

Engine Fuel System Schematic (Typical)

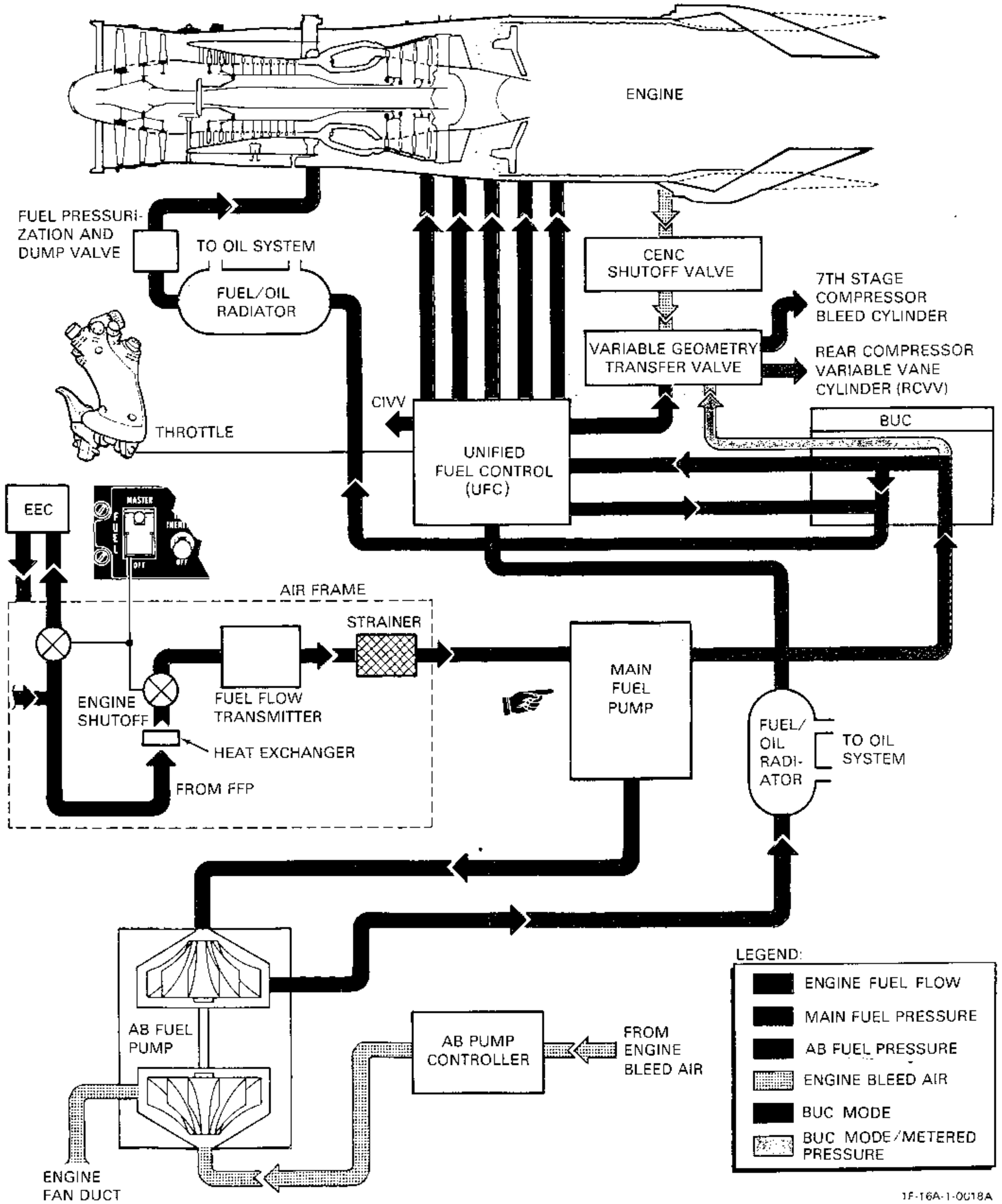


Figure FO-4.

Fuel System A

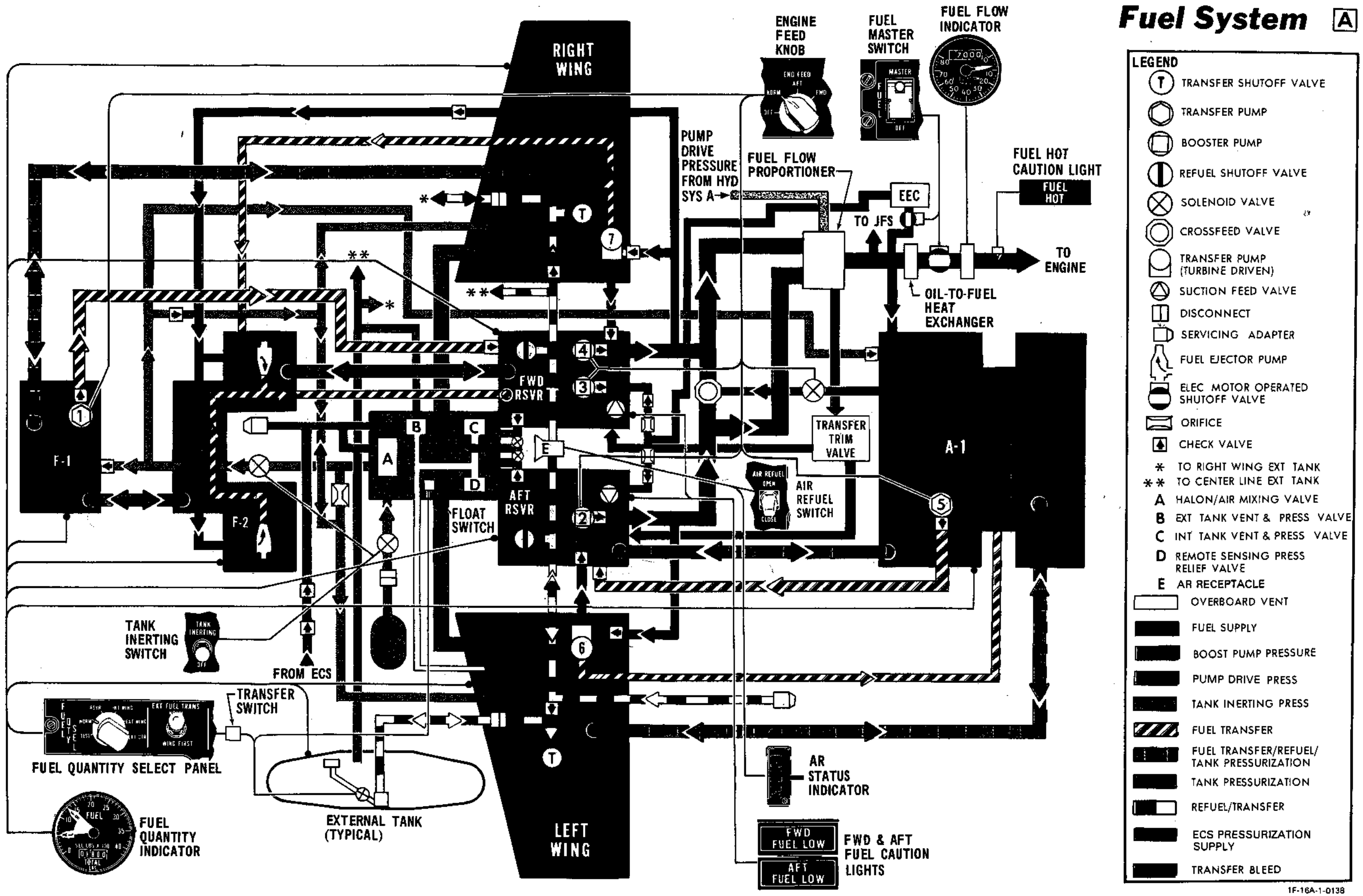
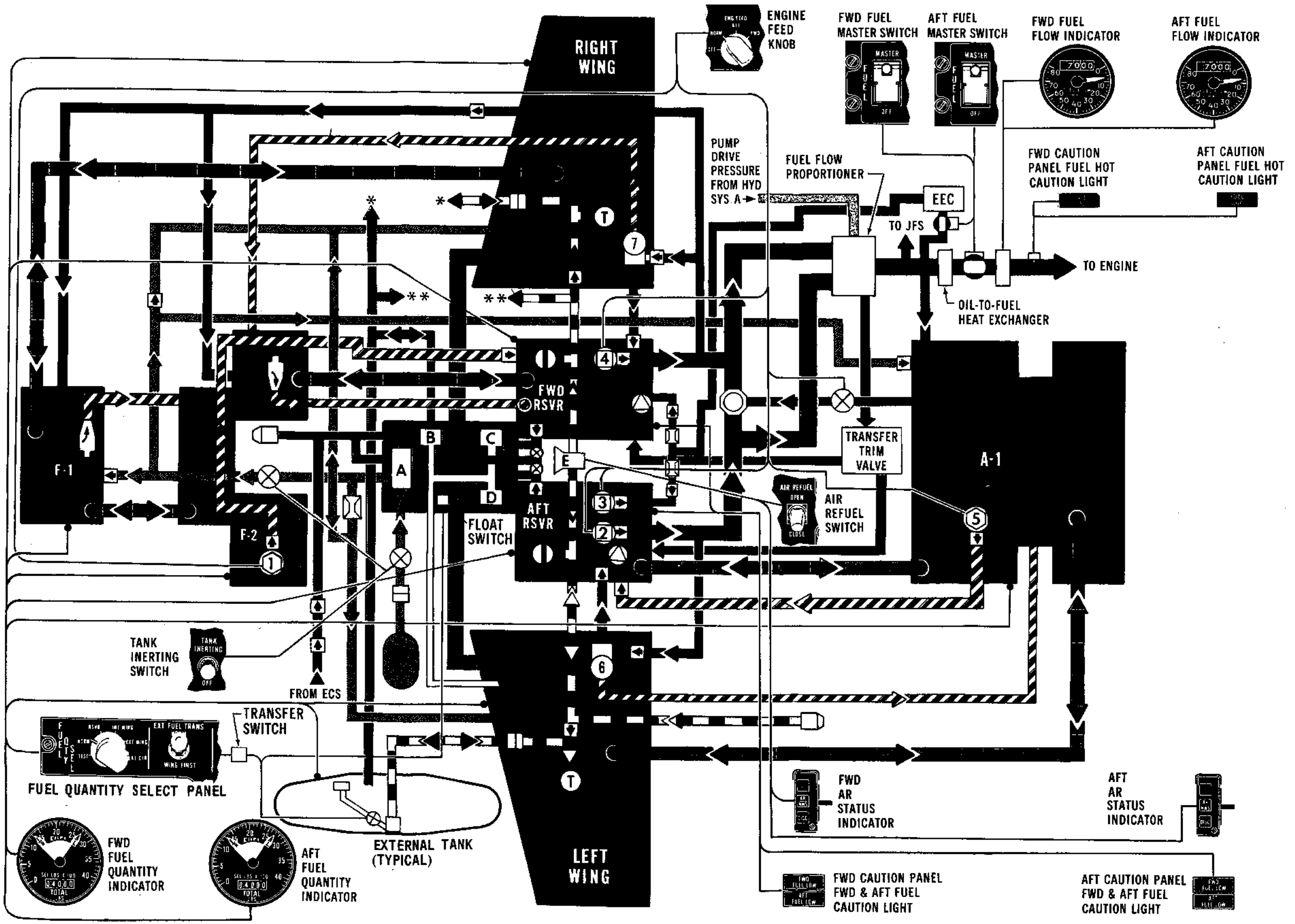
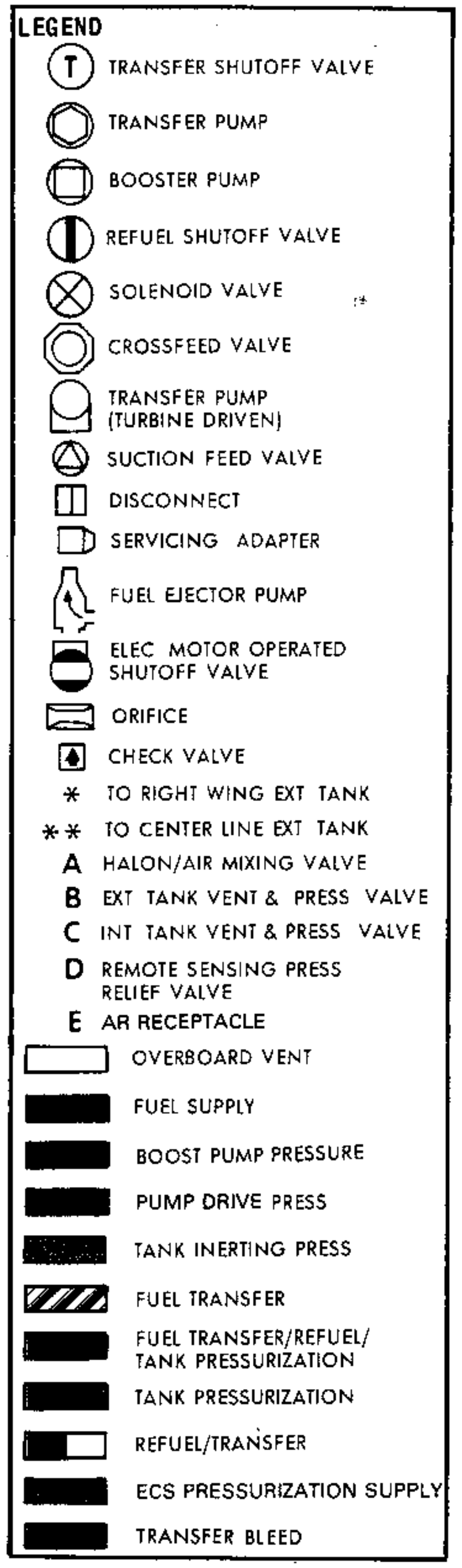


Figure FO-5.

Fuel System B





1F-16A-1-0139

Figure FO-6.

Electrical Power Distribution Diagram

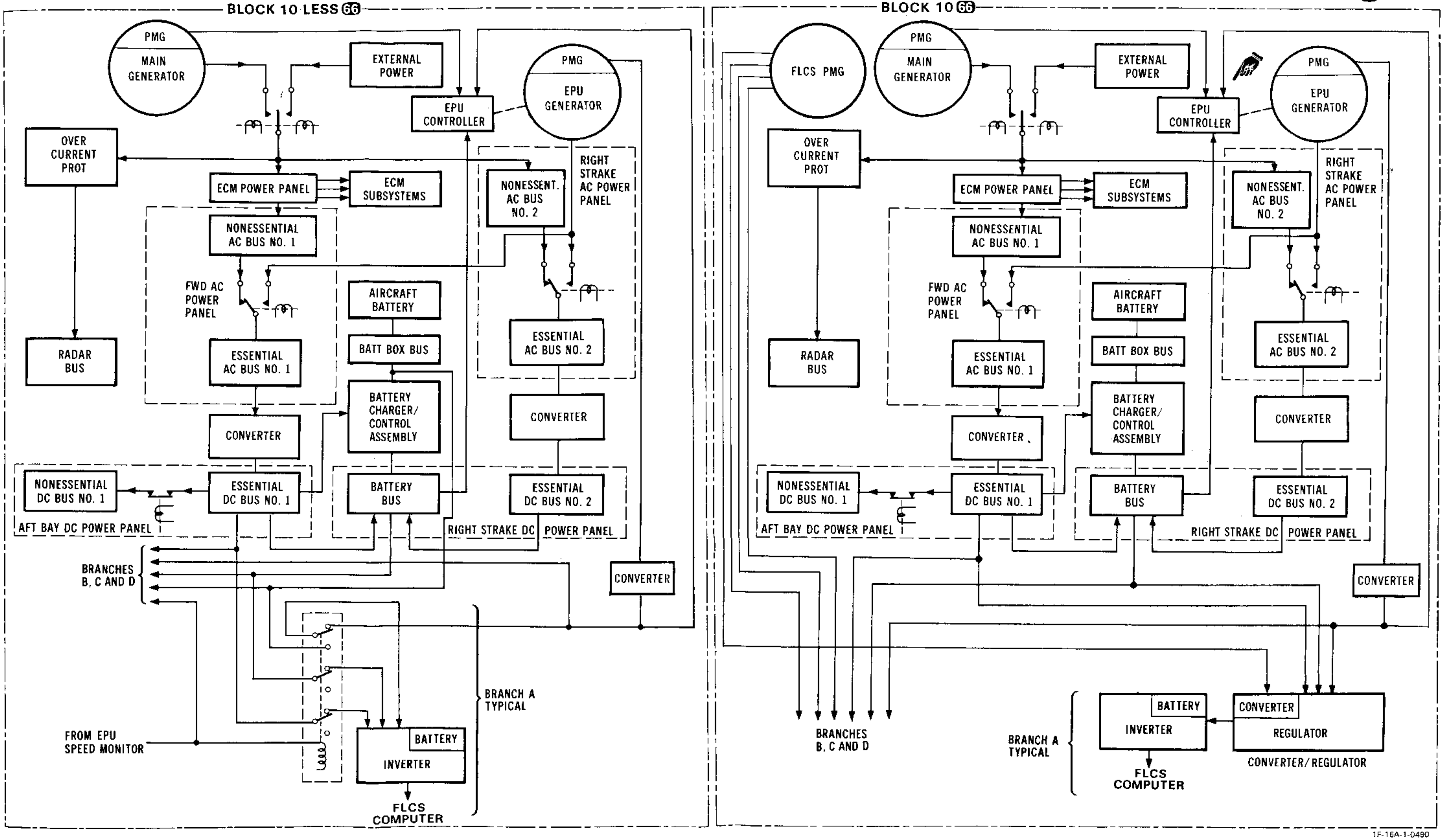


Figure FO-7. (Sheet 1)

Electrical Power Distribution Diagram

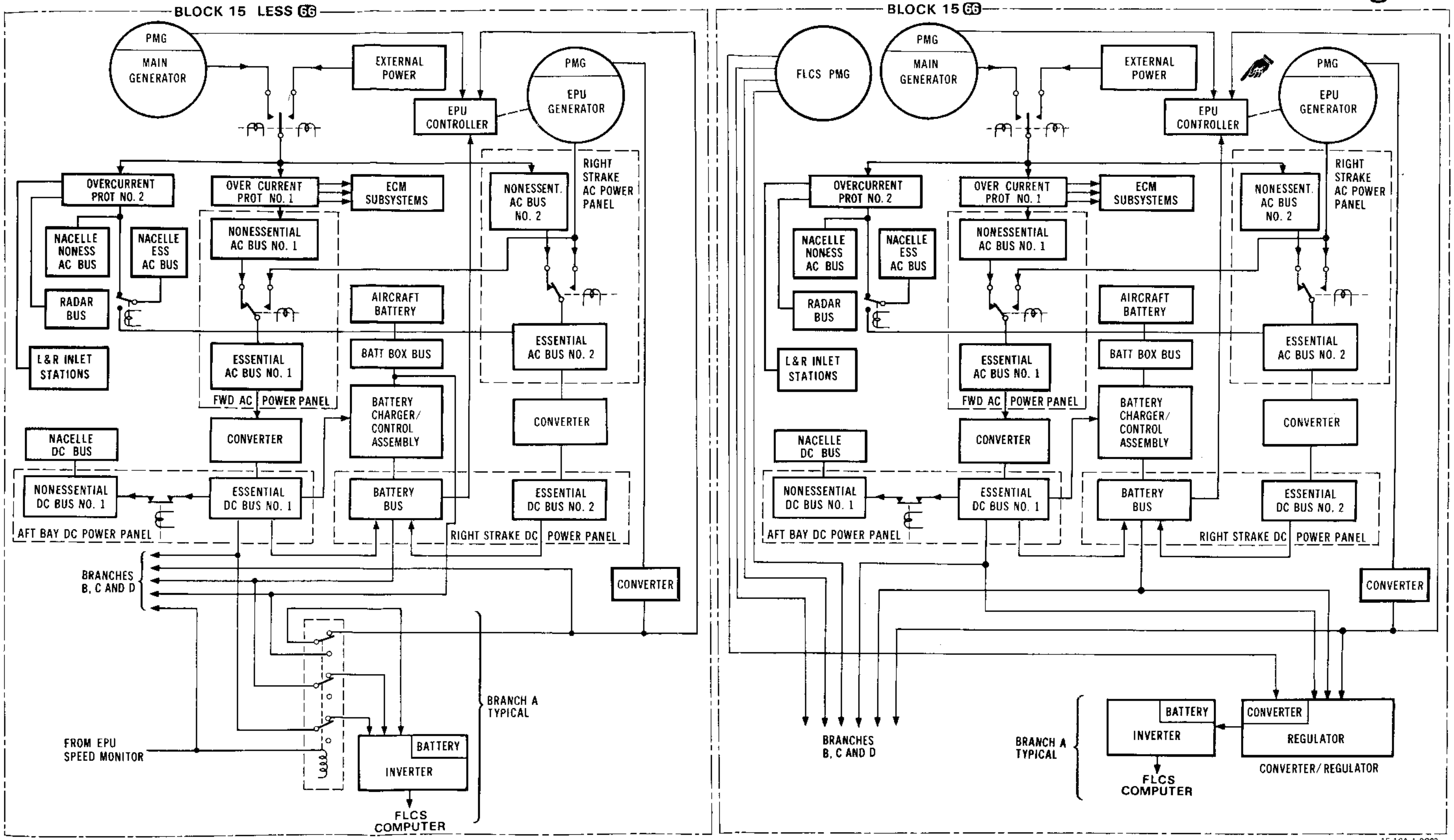


Figure FO-7. (Sheet 2)

Hydraulic Power Supply

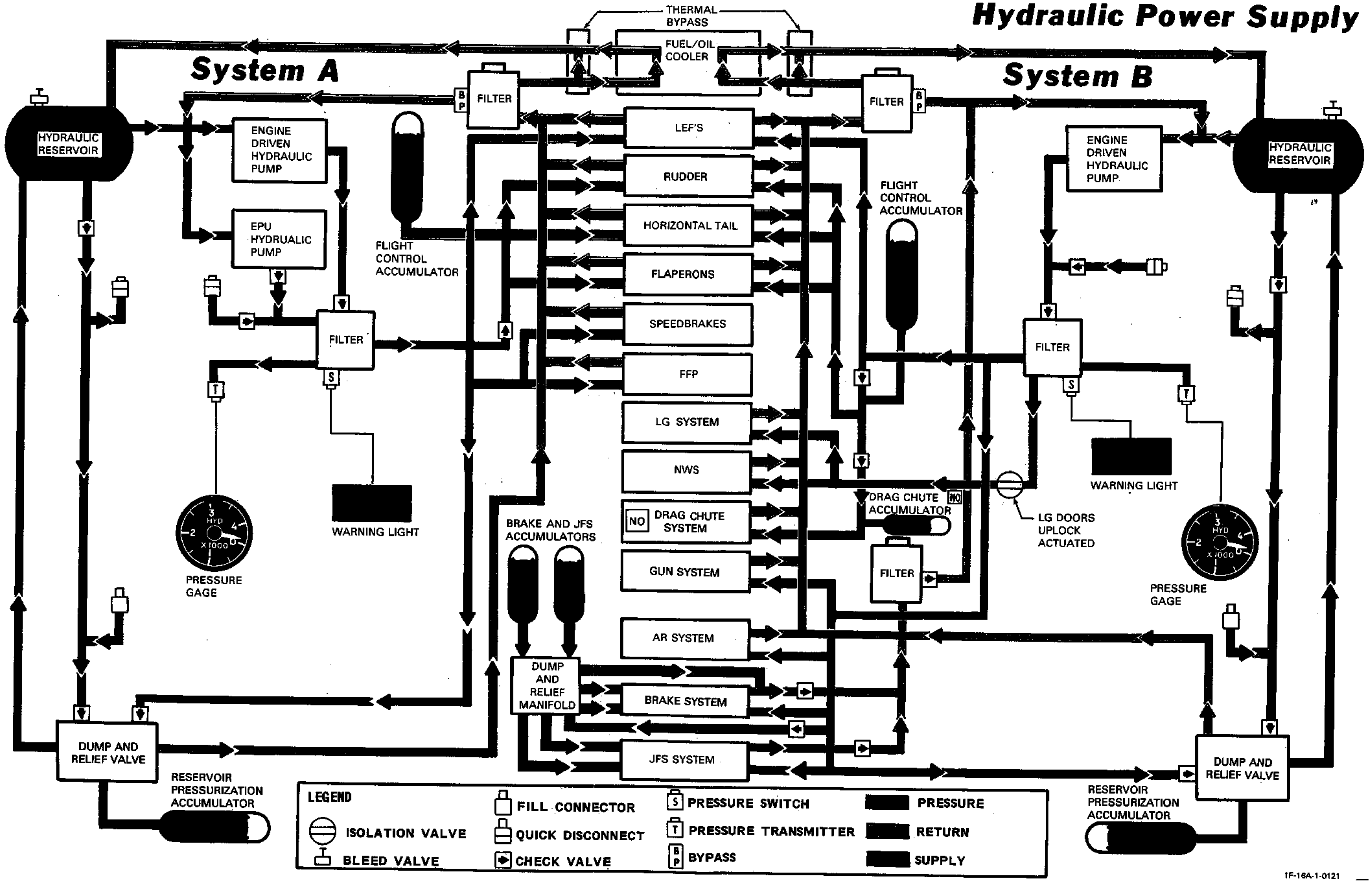
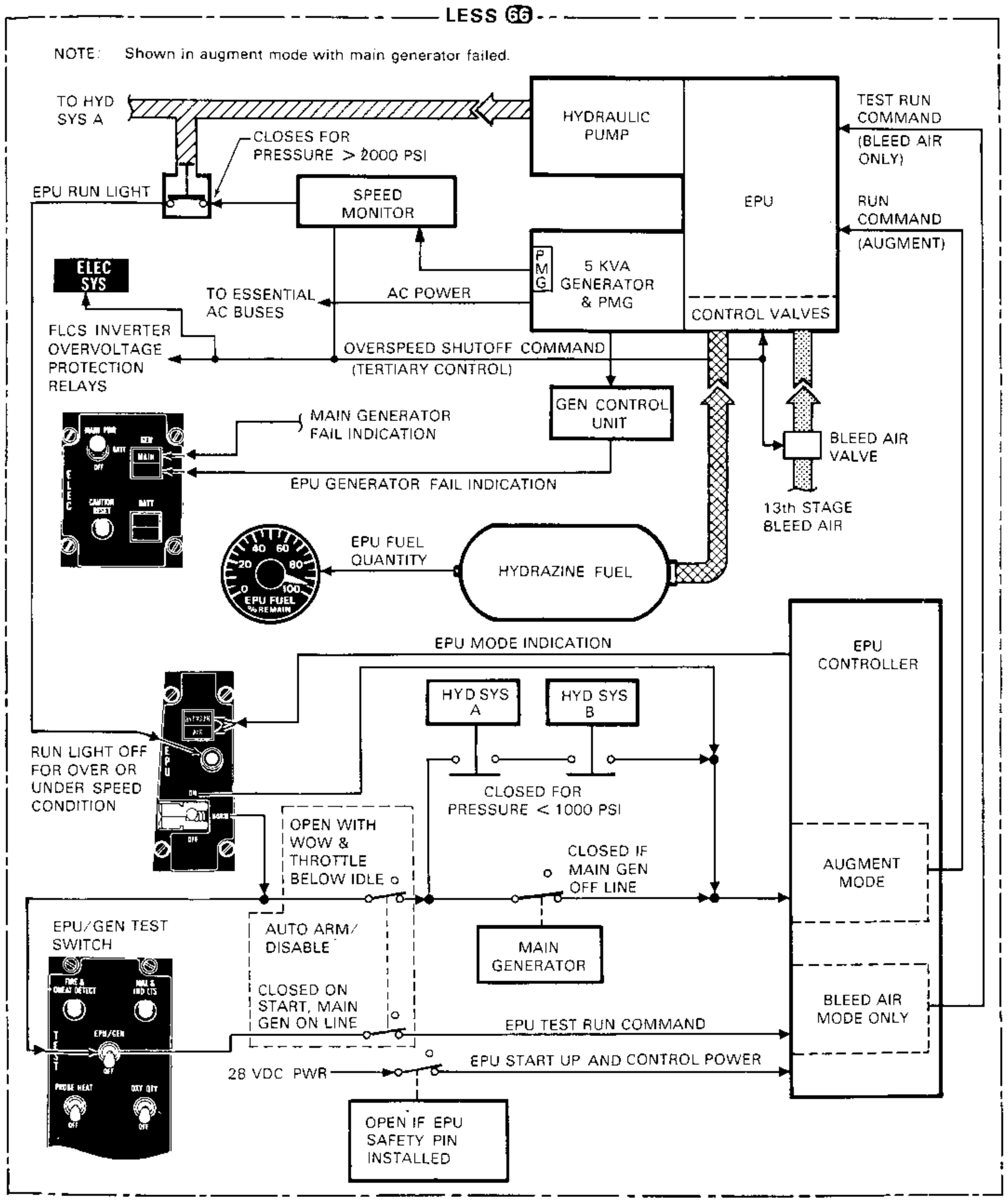


Figure FO-8.

Emergency Power Unit Schematic (Typical)



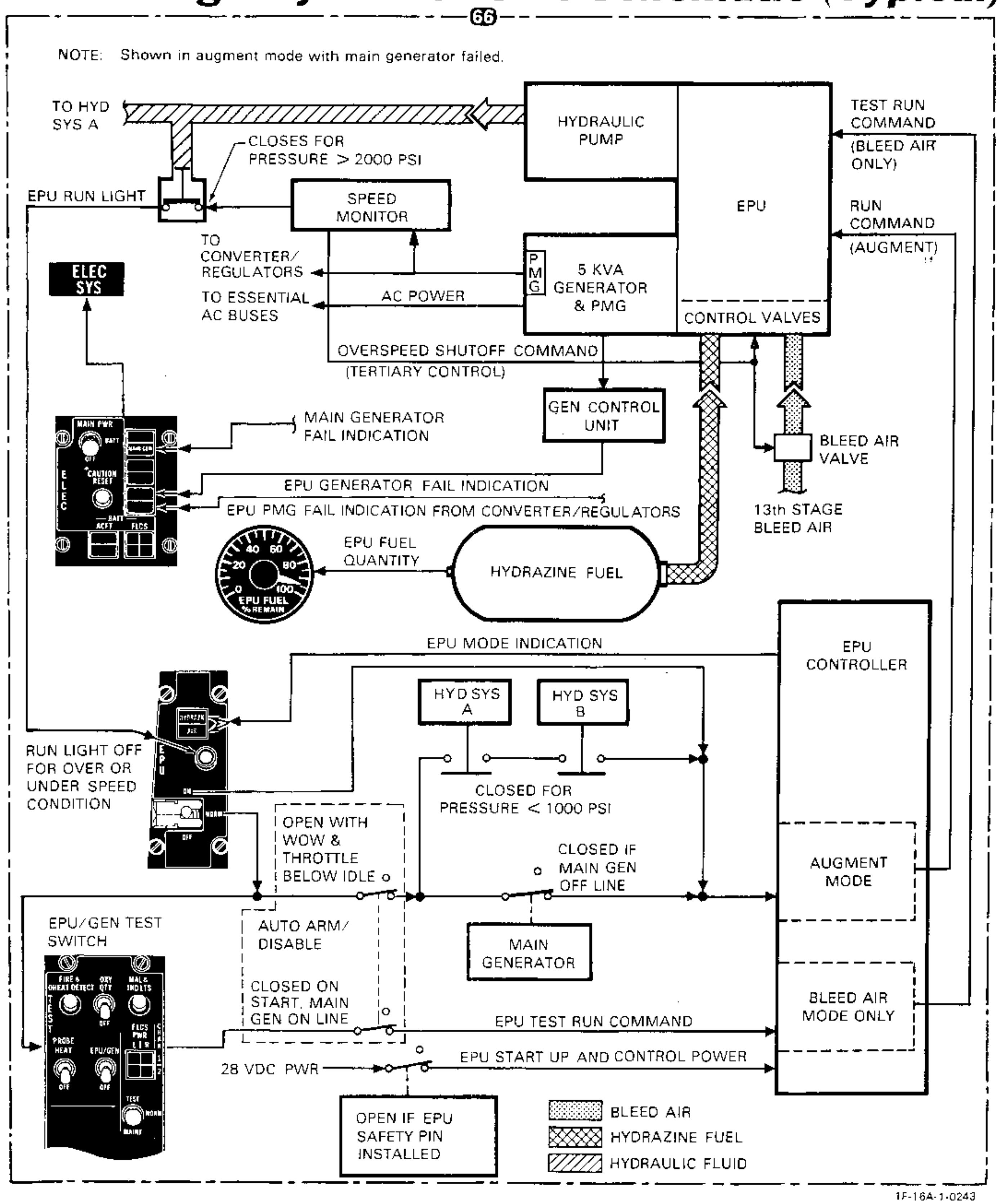


Figure FO-9.

Wheel Brake Schematic (Typical)

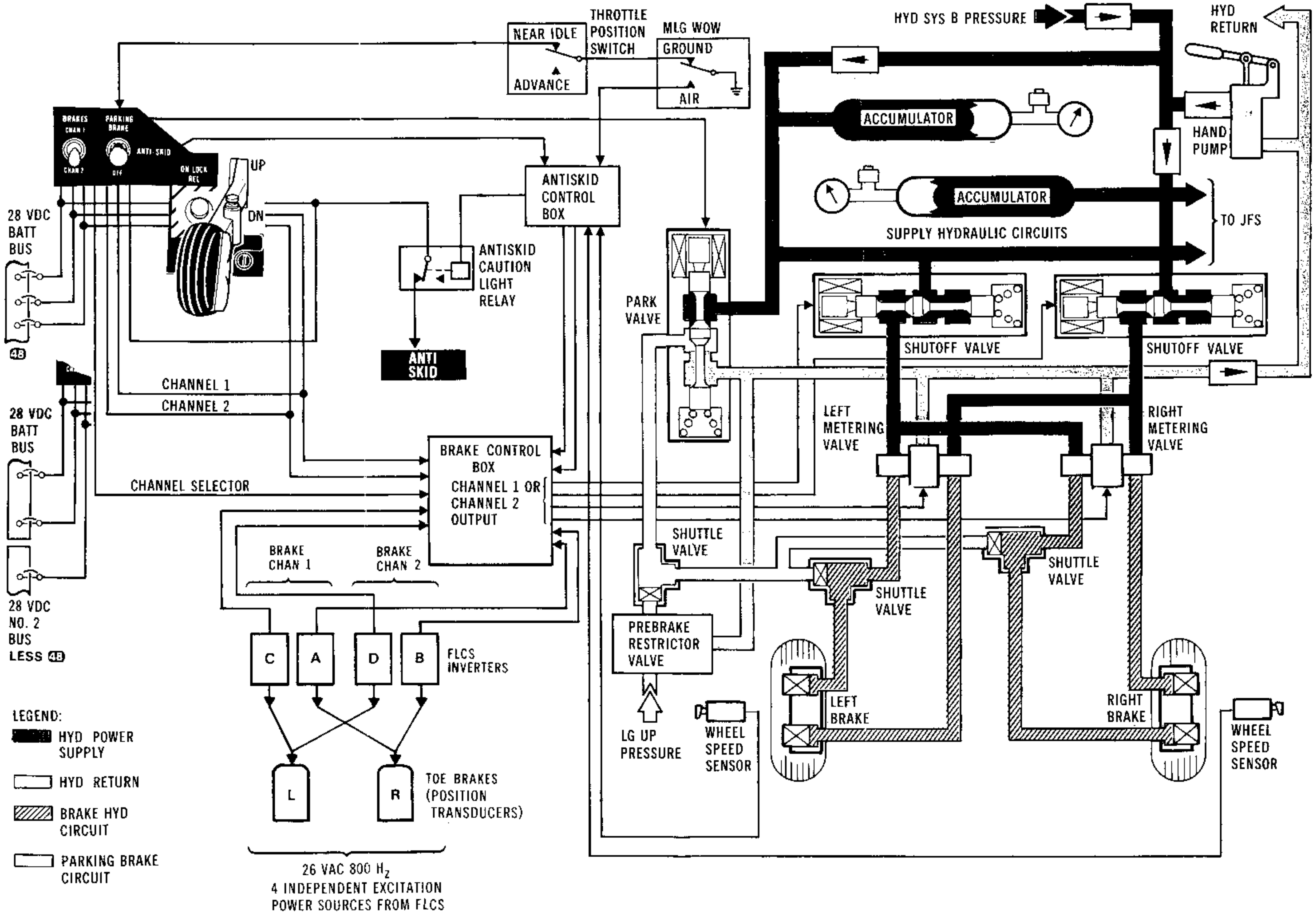


Figure FO-10.

FLCS Functional Schematic (Typical)

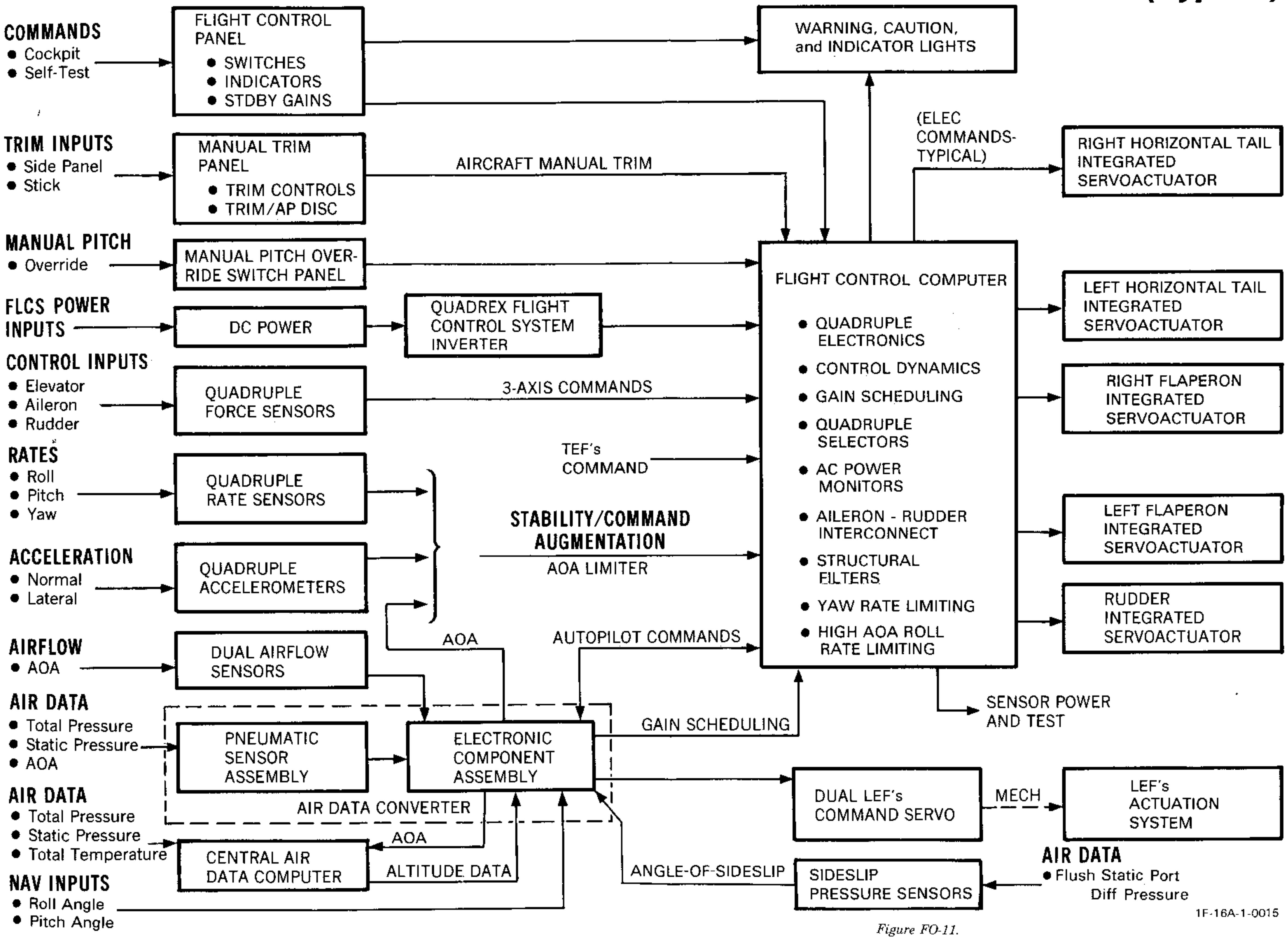


Figure FO-11.

FLCS Pitch, Roll & Yaw Schematic (Typical)

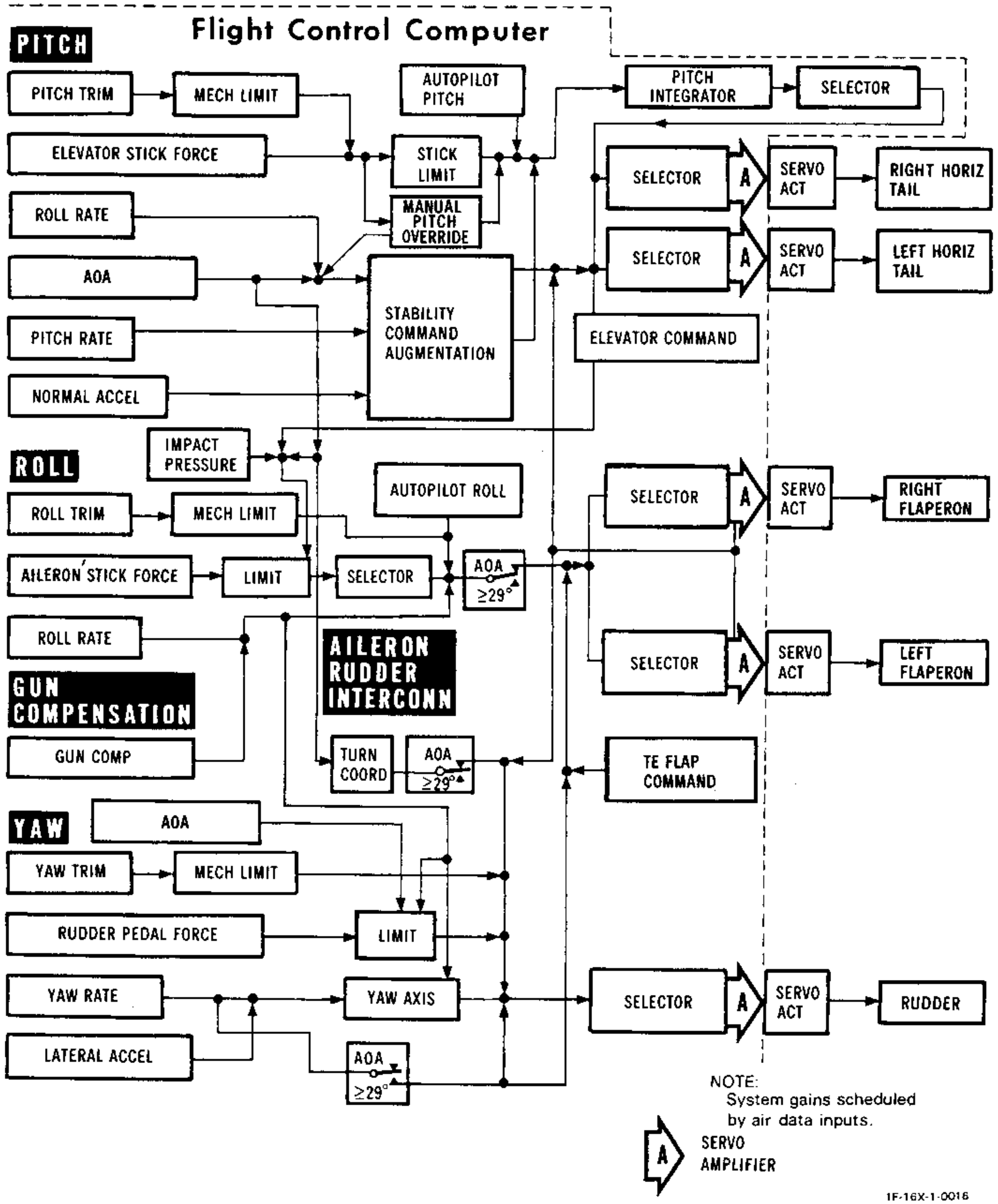
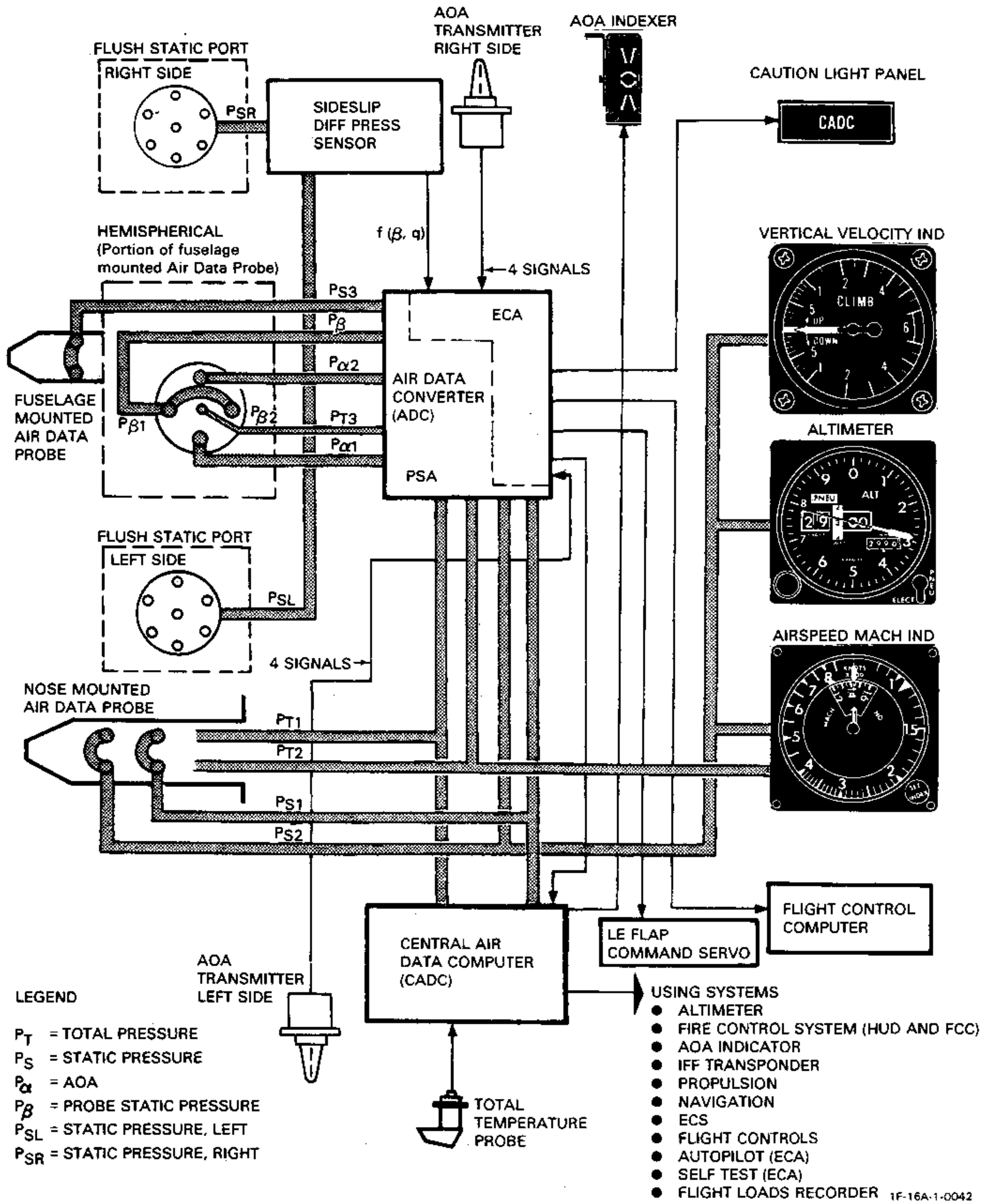


Figure FO-12.

Air Data System Schematic (Typical)

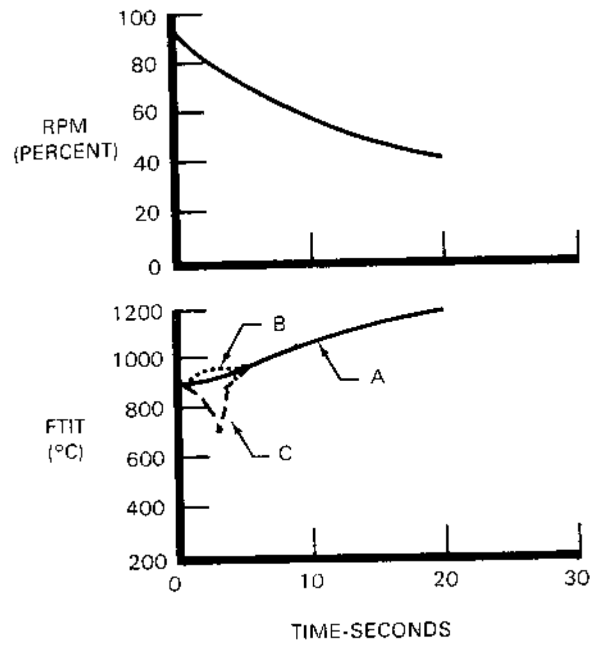


LEGEND

- P_T = TOTAL PRESSURE
- P_S = STATIC PRESSURE
- P_α = AOA
- P_β = PROBE STATIC PRESSURE
- P_{SL} = STATIC PRESSURE, LEFT
- P_{SR} = STATIC PRESSURE, RIGHT

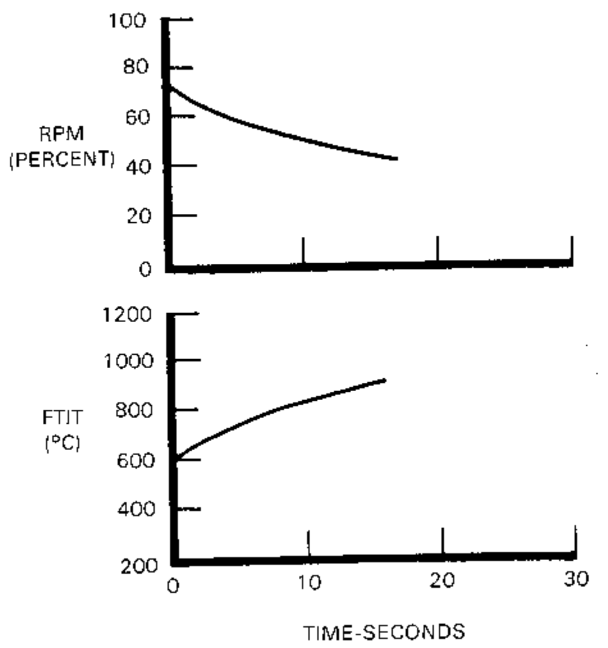
Figure FO-13.

FTIT and RPM Response During Engine Stagnation



FTIT & RPM RESPONSE FOLLOWING HIGH THRUST STAGNATION (TYPICAL)

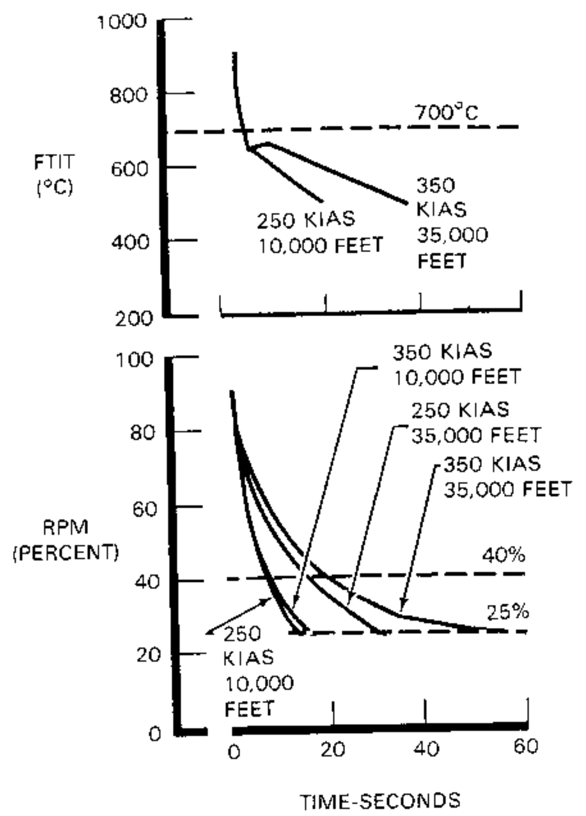
The FTIT signature varies within the initial few seconds after a high-thrust stagnation, as shown by the three cases discussed. Case A shows typical rapid decrease in rpm and steady increase in FTIT. Case B shows a momentary step increase in FTIT which, within a few seconds, turns into a steady increase; rpm decreases rapidly. Case C shows an immediate drop in FTIT of up to 200°C as a result of momentary main combustor blowout. Reignition always occurs within a few seconds causing FTIT to rise rapidly. Again rpm decreases rapidly.



FTIT & RPM RESPONSE FOLLOWING A LOW THRUST STAGNATION (TYPICAL)

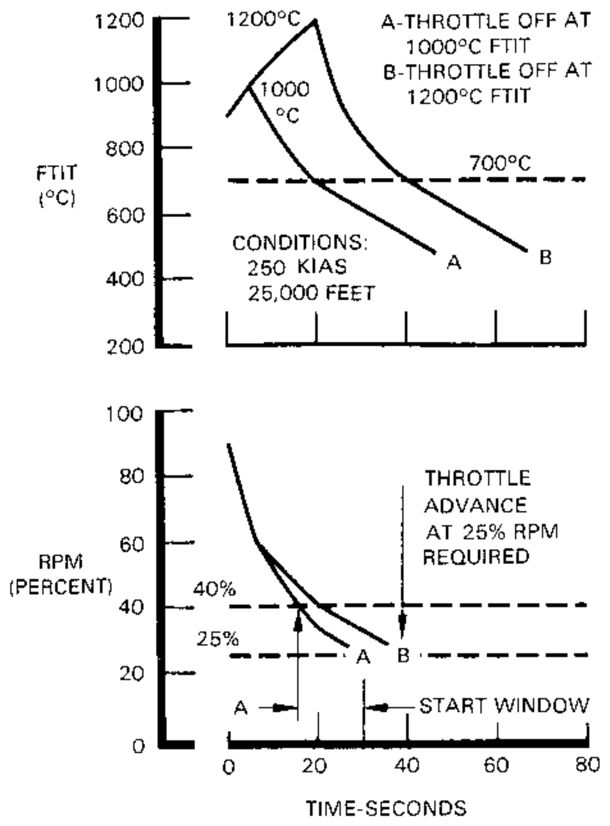
During a low-thrust stagnation, FTIT increases while rpm decreases in a manner similar to that shown. The rate at which FTIT increases and rpm decreases varies with altitude and airspeed.

FTIT following a low thrust stagnation will often level off at 800 – 1000°C. However, rpm drops-off at the same rate regardless of FTIT response.



RATE OF FTIT & RPM DECAY AS A FUNCTION OF ALTITUDE AND AIRSPEED (TYPICAL)

The effect of airspeed and altitude on rpm & FTIT decay is shown above. At low altitude, regardless of airspeed, the spooldown rate is rapid, thus decreasing the time available in the airstart window. (FTIT less than 700°C rpm between 40 — 25 percent).

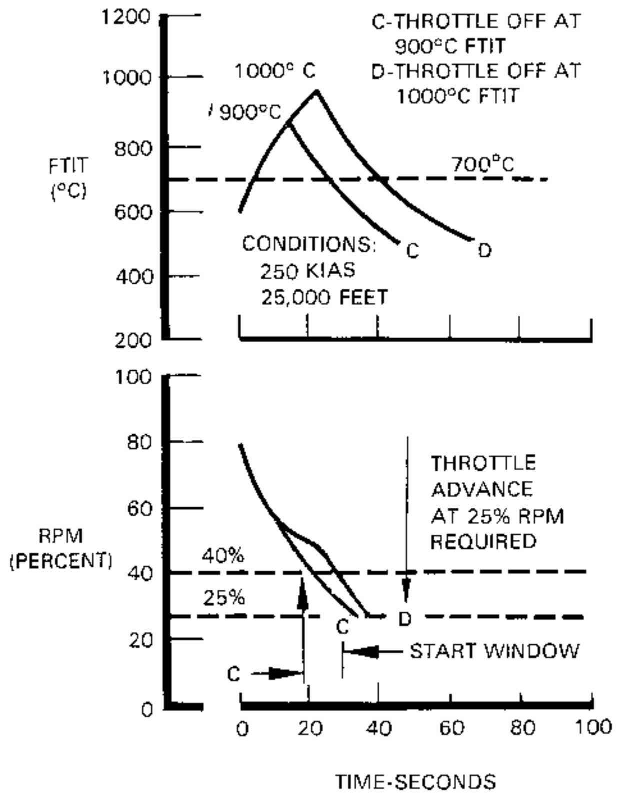


RATE OF RPM & FTIT DECAY AS A FUNCTION OF THROTTLE MANAGEMENT AFTER A HIGH THRUST STAGNATION (TYPICAL)

Examples of throttle management during high & low thrust stagnations and its affect on the airstart window are illustrated above. Allowing the engine to remain stagnated reduces spooldown airstart window.

Case A shows an engine with throttle placed in OFF when FTIT reached 1000°C. The spooldown airstart window is indicated and there is no significant engine turbine distress.

Case B shows an engine with throttle placed in OFF when FTIT reached 1200°C. There is no real spooldown airstart window on first attempt since minimum rpm was reached before FTIT cooled below 700°C and possible engine turbine distress had occurred which might affect airstart success.

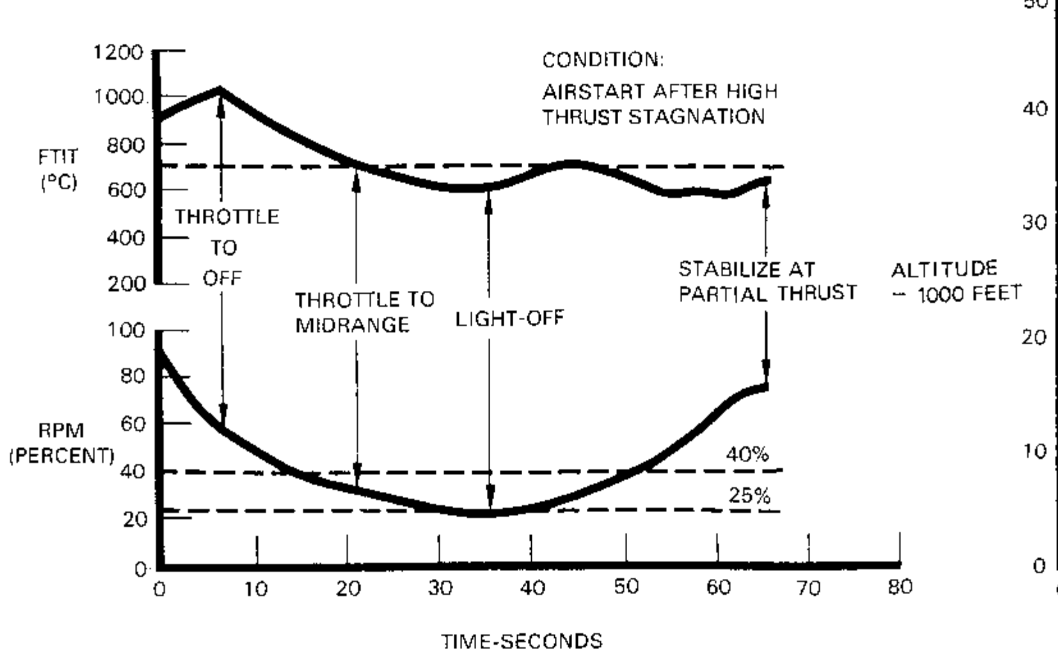


RATE OF FTIT & RPM DECAY AS A FUNCTION OF THROTTLE MANAGEMENT AFTER A LOW THRUST STAGNATION (TYPICAL)

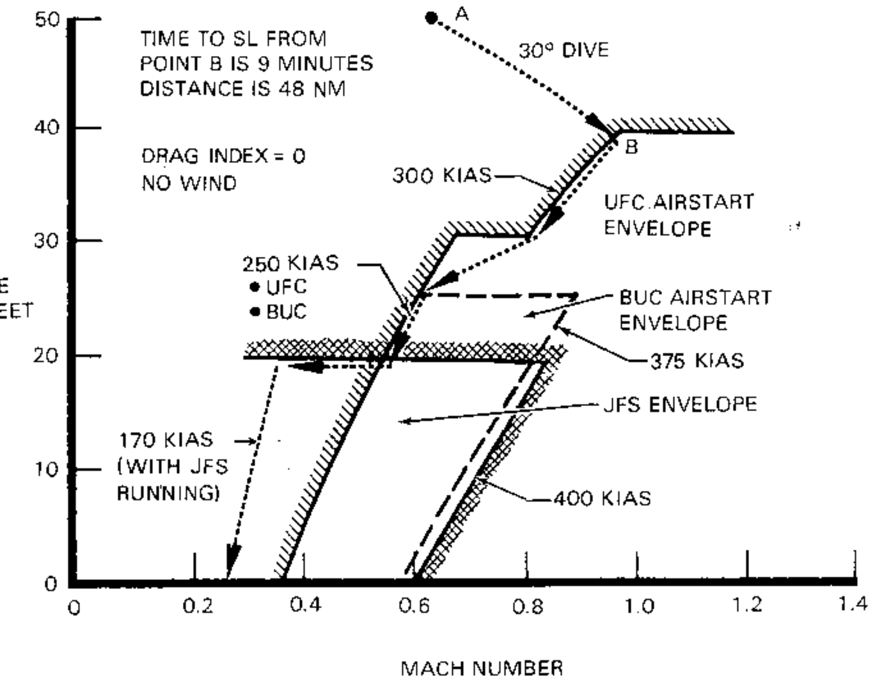
Allowing the engine to remain stagnated reduces spooldown airstart window.

Case C shows an engine with throttle placed in OFF when FTIT was 900°C and rpm was below 60 percent. The spooldown airstart window is indicated.

Case D shows an engine with throttle placed in OFF when FTIT reached 1000°C. There is no real spooldown airstart window on the first attempt. The options were the same as those described in Case B on high-thrust stagnation airstarts.



TIME TRACE OF NORMAL AIRSTART FTIT AND RPM FOLLOWING HIGH THRUST STAGNATION (TYPICAL)



OPTIMUM FLIGHT PATH DURING AIRSTARTING (TYPICAL)

Engine out descent path is shown above which will maintain the aircraft in the required airstart flight conditions during descent. A 30 degree dive is the optimum method to approach the airstart envelope.

1F-16A-1-0360

Figure FO-14.

Aircraft Modification/Retrofit Information

TV CODE/ T.O. NO.	SHORT TITLE	EFFECTIVITY PRODUCTION	EFFECTIVITY *RETROFIT
51 1F-16-845 *(In work; Rescission Date: May 84)	Block 15B Software Update (ECP 0406) Incorporate Block 15B HUD and Fire Control Radar Computer Software Changes (ECP 0496)	[US] F-16A 80-0597 and on	[US] F-16A 78-0001 thru 80-0596; F-16B Complete
		[BE] F-16A 80-3547/FA-56 and on; FA-16B 80-3588/FB-13 and on	[BE] F-16A 78-0116/FA-1 thru 80-3546/FA-55; F-16B 78-0162/FB-1 thru 78-0173/FB-12
			[DE] Complete
			[NE] Complete
			[NO] Complete
52 1F-16-1007 *(In work; Rescission Date: Jun 84)	Correction of ECA Memory Latch-up (ECP 0623)	[US] F-16A 81-0764 and on; F-16B 81-0819 and on	[US] F-16A 78-0001 thru 81-0763; F-16B 78-0077 thru 81-0818
		[BE] F-16A 80-3557/FA-66 and on; F-16B NA	[BE] F-16A 78-0116/FA-1 thru 80-3556/FA-65; F-16B 78-0162/FB-1 thru 80-3595/FB-20
		[DE] F-16A 80-3610 and on; F-16B 80-3615 and on	[DE] F-16A 78-0174 thru 80-3609; F-16B 78-0204 thru 80-3614
		[NE] F-16A 80-3636 and on; F-16B 80-3654 and on	[NE] F-16A 78-0212 thru 80-3635; F-16B 78-0259 thru 80-3653
			[NO] Complete
56 1F-16-782 *(In work; Rescission Date: Dec 86)	Canopy Open/Close Circuitry (ECP 0426)	[US] F-16A 80-0541 and on; F-16B 80-0635 and on	[US] F-16A 78-0001 thru 80-0540; F-16B 78-0077 thru 80-0634
		[BE] F-16A 80-3547/FA-56 and on; F-16B 80-3588/FB-13 and on	[BE] F-16A 78-0116/FA-1 thru 80-3546/FA-55; F-16B 78-0162/FB-1 thru 78-0173/FB-12
		[DE] F-16A 80-3596 and on; F-16B 80-3612 and on	[DE] F-16A 78-0174 thru 78-0203; F-16B 78-0204 thru 78-0211
		[NE] F-16A 78-0258 and on; F-16B 80-3649 and on	[NE] F-16A 78-0212 thru 78-0257; F-16B 78-0259 thru 78-0271
		[NO] F-16A 78-0300 and on; F-16B 80-3689 and on	[NO] F-16A 78-0272 thru 78-0299; F-16B 78-0301 thru 78-0307
57 1F-16-928 *(In work; Rescission Date: Oct 86)	Incorporate Engine Warning Light and Voice Warning/Caution System (ECP 0539)		[US] Complete
		[BE] F-16A 80-3552/FA-61 and on; F-16B 80-3593/FB-18 and on	[BE] F-16A 78-0116/FA-1 thru 80-3551/FA-60; F-16B 78-0162/FB-1 thru 80-3592/FB-17
		[DE] F-16A 80-3607 and on; F-16B 80-3614 and on	[DE] F-16A 78-0174 thru 80-3606; F-16B 78-0204 thru 80-3613
		[NE] F-16A 80-3630 and on; F-16B 80-3652 and on	[NE] F-16A 78-0212 thru 80-3629; F-16B 78-0259 thru 80-3651
		[NO] F-16A 80-3668 and on; F-16B 80-3692 and on	[NO] F-16A 78-0272 thru 80-3667; F-16B 78-0301 thru 80-3691
59 1F-16-1052 *(In work; Rescission Date: Oct 86)	Install Constant Speed Drive Hydraulic Accumulator (ECP 0778)		[US] Complete
		[BE] F-16A 80-3557/FA-66 and on; F-16B NA	[BE] F-16A 78-0116/FA-1 thru 80-3556/FA-65; F-16B 78-0162/FB-1 thru 80-3595/FB-20
59 None *In work: Est Completion Date: Dec 84	[DE] Modify CSD Oil Circuit (ECP 0816)	[DE] ECP 0778 Removed and replaced by ECP 0816 after aircraft delivery	[DE] ECP 0778 Cancelled and replaced by ECP 0816
			[NE] Complete
			[NO] Complete
66 1F-16-1103 *(In work; Rescission Date: Oct 87) If not completed prior to 66, the following TV codes will be completed during 66: 35, 38, 48, and 56	Provide Direct Power Source to FLCS (ECP 0822)	[US] F-16A 82-0945 and on less 82-0966 and 82-0974; F-16B 82-1034 and on	[US] F-16A 78-0001 thru 82-0944, 82-0966, and 82-0974; F-16B 78-0077 thru 82-1033
		[BE] NA	[BE] NA
		[DE] NA	[DE] F-16A 78-0174 thru 80-3611; F-16B 78-0204 thru 80-3614
		[NE] F-16A 80-3646 and on; F-16B 81-0882 and on	[NE] F-16A 78-0212 thru 80-3645; F-16B 78-0259 thru 80-3657
		[NO] F-16A 80-3684 and on; F-16B NA	[NO] F-16A 78-0272 thru 80-3683; F-16B 78-0301 thru 80-3693 thru 80-3693
68 1F-16-1183 *(In work; Rescission Date: Jul 86)	Modify FLCS to Prevent Pitchup During Landing Roll (ECP 0694)	[US] F-16A 80-0541 and on; F-16B 80-0635 and on	[US] F-16A 78-0001 thru 80-0540; F-16B 78-0077 thru 80-0634
		[BE] NA	[BE] NA
		[DE] F-16A 80-3596 and on; F-16B 80-3612 and on	[DE] F-16A 78-0174 thru 78-0203; F-16B 78-0204 thru 78-0211
		[NE] F-16A 78-0258 and on; F-16B 80-3649 and on	[NE] F-16A 78-0212 thru 78-0257; F-16B 78-0259 thru 78-0271
		[NO] F-16A 78-0300 and on; F-16B 80-3689 and on	[NO] F-16A 78-0272 thru 78-0299; F-16B 78-0301 thru 78-0307
69 1F-16-1183 *(In work; Rescission Date: Jul 86)	Power Approach Improvements (ECP 0696)	[US] F-16A 82-0966 and on; F-16B 82-1038 and on	[US] F-16A 78-0001 thru 82-0965; F-16B 78-0077 thru 82-1037
		[BE] NA	[BE] NA
		[DE] F-16A NA; F-16B 80-3615 and on	[DE] F-16A 78-0174 thru 80-3611; F-16B 78-0204 thru 80-3614
		[NE] F-16A 80-3646 and on; F-16B 81-0882 and on	[NE] F-16A 78-0212 thru 80-3645; F-16B 78-0259 thru 80-3657
		[NO] F-16A 80-3684 and on; F-16B NA	[NO] F-16A 78-0272 thru 80-3683; F-16B 78-0301 thru 80-3693
70 1F-16-959 XX1F-16-1206	Horizontal Tail ISA Retrim		[US] Complete
		[BE] NA	[BE] NA
			[DE] Complete
		[NE] Complete	**[NE] F-16A 78-0212 thru 78-0257; F-16B 78-0259 thru 78-0271
		[NO] Complete	**[NO] F-16A 78-0272 thru 78-0299; F-16B 78-0301 thru 78-0307

**To be completed during 68

1F-16A-1-0631B

Figure FO-16. (Sheet 2)

Aircraft Modification/Retrofit Information

TV CODE/ T.O. NO.	SHORT TITLE	EFFECTIVITY PRODUCTION	EFFECTIVITY *RETROFIT
35 1F-16B-520	EEC Caution Light Illuminates When BUC Selected From Rear Cockpit (ECP 0490) *(In work; Rescission Date: Jan 87)	US F-16B 79-0429 and on	US F-16B 78-0077 thru 79-0428
		BE F-16B 78-0173/FB-12 and on	BE F-16B 78-0162/FB-1 thru 78-0172/FB-11
		DE F-16B 78-0211 and on	DE F-16B 78-0204 thru 78-0210
		NE F-16B 78-0269 and on	NE F-16B 78-0259 thru 78-0268
		NO F-16B 78-0306 and on	NO F-16B 78-0301 thru 78-0305
37 1F-16-681	Incorporate Departure Warning System (ECP 0221) *(In work; Rescission Date: Dec 86)	US F-16A 80-0541 and on; F-16B 80-0635 and on	US F-16A 78-0001 thru 80-0540; F-16B 78-0077 thru 80-0634
		BE F-16A 80-3547/FA-56 and on; F-16B 80-3588/ FB-13 and on	BE F-16A 78-0116/FA-1 thru 80-3546/FA-55; F-16B 78-0162/FB-1 thru 78-0173/FB-12
		DE F-16A 80-3596 and on; F-16B 80- 3612 and on	DE F-16A 78-0174 thru 78-0203; F-16B 78-0259 thru 78-0211
		NE F-16A 78-0258 and on; F-16B 80-3649 and on	NE F-16A 78-0212 thru 78-0257; F-16B 78-0259 thru 78-0271
			NO Complete

TV CODE/ T.O. NO.	SHORT TITLE	EFFECTIVITY PRODUCTION	EFFECTIVITY *RETROFIT
38 1F-16B-516	Interchange Master Fuel and BUC Switches in Rear Cockpit, F-16B (ECP 0437) *(In work; Rescission Date: Jan 85)	US F-16B 80-0635 and on	US F-16B 78-0077 thru 80-0634
		BE F-16B 80-3588/FB-13 and on	BE F-16B 78-0162/FB-1 thru 78-0173/FB-12
		DE F-16B 80-3612 and on	DE F-16B 78-0204 thru 78-0211
		NE F-16B 80-3649 and on	NE F-16B 78-0259 thru 78-0271
		NO F-16B 80-3689 and on	NO F-16B 78-0301 thru 78-0307
39 1F-16-781	Improve Exterior Lighting (ECP 0287) *(In work; Rescission Date: Apr 87)	US F-16A 80-0541 and on; F-16B 80-0635 and on	US F-16A 78-0001 thru 80-0540; F-16B 78-0077 thru 80-0634
		BE F-16A 80-3547/FA-56 and on; F-16B 80-3588/ FB-13 and on	BE F-16A 78-0116/FA-1 thru 80-3546/FA-55; F-16B 78-0162/FB-1 thru 78-0173/FB-12
		DE F-16A 80-3596 and on; F-16B 80-3612 and on	DE F-16A 78-0174 thru 78-0203; F-16B 78-0204 thru 78-0211
		NE F-16A 78-0258 and on; F-16B 80-3649 and on	NE F-16A 78-0212 thru 78-0257; F-16B 78-0259 thru 78-0271
		NO F-16A 78-0300 and on; F-16B 80-3689 and on	NO F-16A 78-0272 thru 78-0299; F-16B 78-0301 thru 78-0307
41 1F-16A-505	ID Light DE NO A (ECP 0567) *(In work; Rescission Date: Mar 83; Actual Completion Unknown)	DE F-16A 80-3598 and on	DE F-16A 78-0174 thru 80-3597
			NO Complete

TV CODE/ T.O. NO.	SHORT TITLE	EFFECTIVITY PRODUCTION	EFFECTIVITY *RETROFIT
42	Hook Caution Light (ECP 0572)	US F-16A 79-0352 and on; F-16B 79-0423 and on	NA
		BE F-16A 78-0143/FA-28 and on; F-16B 80-3588/ FB-13 and on	NA
		DE F-16A 78-0192 and on; F-16B 78-0210 and on	NA
		NE F-16A 78-0243 and on; F-16B 78-0268 and on	NA
		NO F-16A 78-0290 and on; F-16B 78-0306 and on	NA
43 1F-16-906	Provision for Secure Voice With VHF (ECP 0327) *(In work; Rescission Date: Oct 86)		US Complete
		BE F-16A 80-3548/FA-57 and on; F-16B 80-3589/ FB-14 and on	BE F-16A 78-0116/FA-1 thru 80-3547/FA-56; F-16B 78-0162/FB-1 thru 80-3588/FB-13
		DE F-16A 80-3603 and on; F-16B 80-3614 and on	DE F-16A 78-0174 thru 80-3602; F-16B 78-0204 thru 80-3613
		NE F-16A 80-3624 and on; F-16B 80-3651 and on	NE F-16A 78-0212 thru 80-3623; F-16B 78-0259 thru 80-3650
		NO F-16A 80-3664 and on; F-16B 80-3691 and on	NO F-16A 78-0272 thru 80-3663; F-16B 78-0301 thru 80-3690

TV CODE/ T.O. NO.	SHORT TITLE	EFFECTIVITY PRODUCTION	EFFECTIVITY RETROFIT
44	Modified ECM Control Panel (ECP 0246)	US F-16A 78-0052 and on; F-16B 78-0110 and on	NA
		BE F-16A 78-0135/FA-20 and on; F-16B 78-0171/ FB-10 and on	NA
		DE F-16A 78-0181 and on; F-16B 78-0208 and on	NA
		NE F-16A 78-0230 and on; F-16B 78-0265 and on	NA
		NO F-16A 78-0278 and on; F-16B 78-0304 and on	NA
46	Early Provisions for Improved Capability (ECP 0350)	US F-16A 80-0541 and on; F-16B 80-0635 and on	NA
		BE F-16A 80-3547/FA-56 and on; F-16B 80-3588/ FB-13 and on	NA
		DE F-16A 80-3596 and on; F-16B 80-3612 and on	NA
		NE F-16A 78-0258 and on: F-16B 80-3649 and on	NA
		NO F-16A 78-0300 and on; F-16B 80-3689 and on	NA

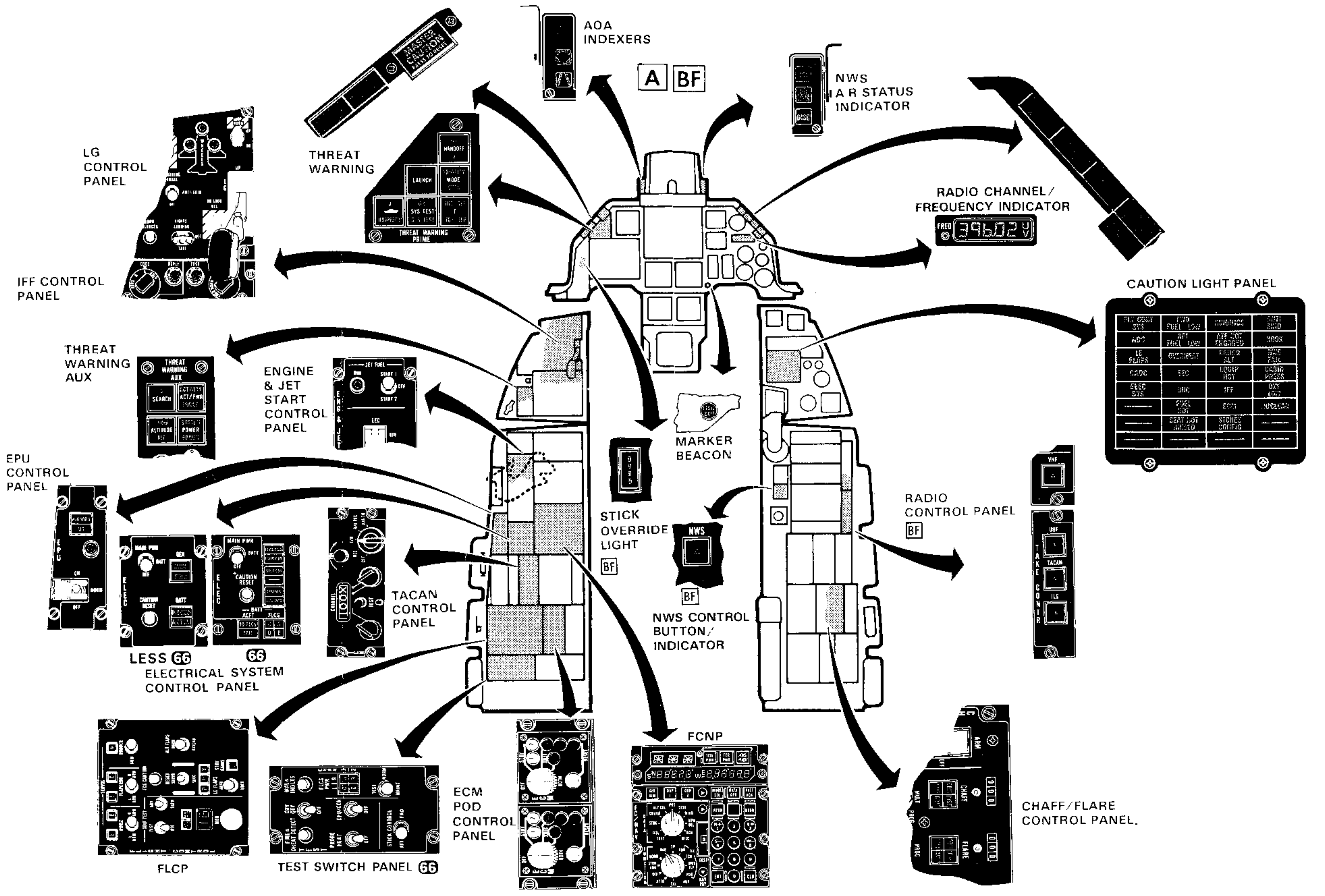
TV CODE/ T.O. NO.	SHORT TITLE	EFFECTIVITY PRODUCTION	EFFECTIVITY *RETROFIT
47	Incorporate Increased Area Horizontal Tail (ECP 0425)	US F-16A 80-0541 and on; F-16B 80-0635 and on	NA
		BE F-16A 80-3547/FA-56 and on; F-16B 80-3588/ FB-13 and on	NA
		DE F-16A 80-3596 and on; F-16B 80-3612 and on	NA
		NE F-16A 78-0258 and on; F-16B 80-3649 and on	NA
		NO F-16A 78-0300 and on; F-16B 80-3689 and on	NA
48 1F-16-909	Brake Circuit Improvement (ECP 0546) *(In work; Rescission Date: Oct 87)	US F-16A 80-0572 and on; F-16B 80-0637 and on	US F-16A 78-0001 thru 80-0571; F-16B 78-0077 thru 80-0636
		BE F-16A 80-3547/FA-56 and on; F-16B 80-3588/ FB-13 and on	BE F-16A 78-0116/FA-1 thru 80-3546/FA-55; F-16B 78-0162/FB-1 thru 78-0173/FB-12
		DE F-16A 80-3598 and on; F-16B 80-3613 and on	DE F-16A 78-0174 thru 80-3597; F-16B 78-0204 thru 80-3612
		NE F-16A 80-3619 and on; F-16B 80-3649 and on	NE F-16A 78-0212 thru 80-3618; F-16B 78-0259 thru 78-0271
		NO F-16A 80-3660 and on; F-16B 80-3690 and on	NO F-16A 78-0272 thru 80-3659; F-16B 78-0301 thru 80-3689

1F-16A-1-0443B

Figure FO-16. (Sheet 1)

Warning, Caution, and Indicator Lights (Typical)

BLOCK 15



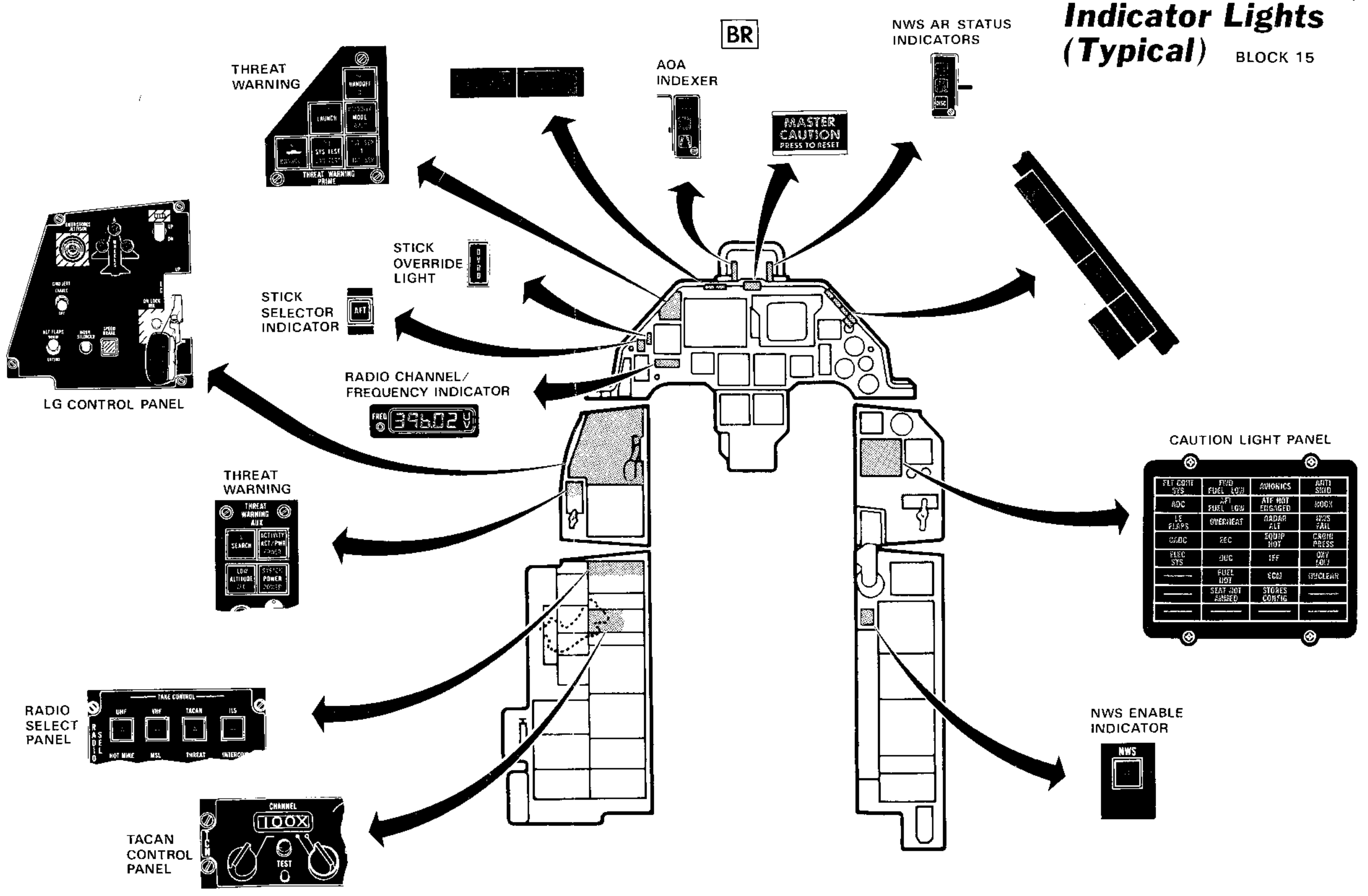
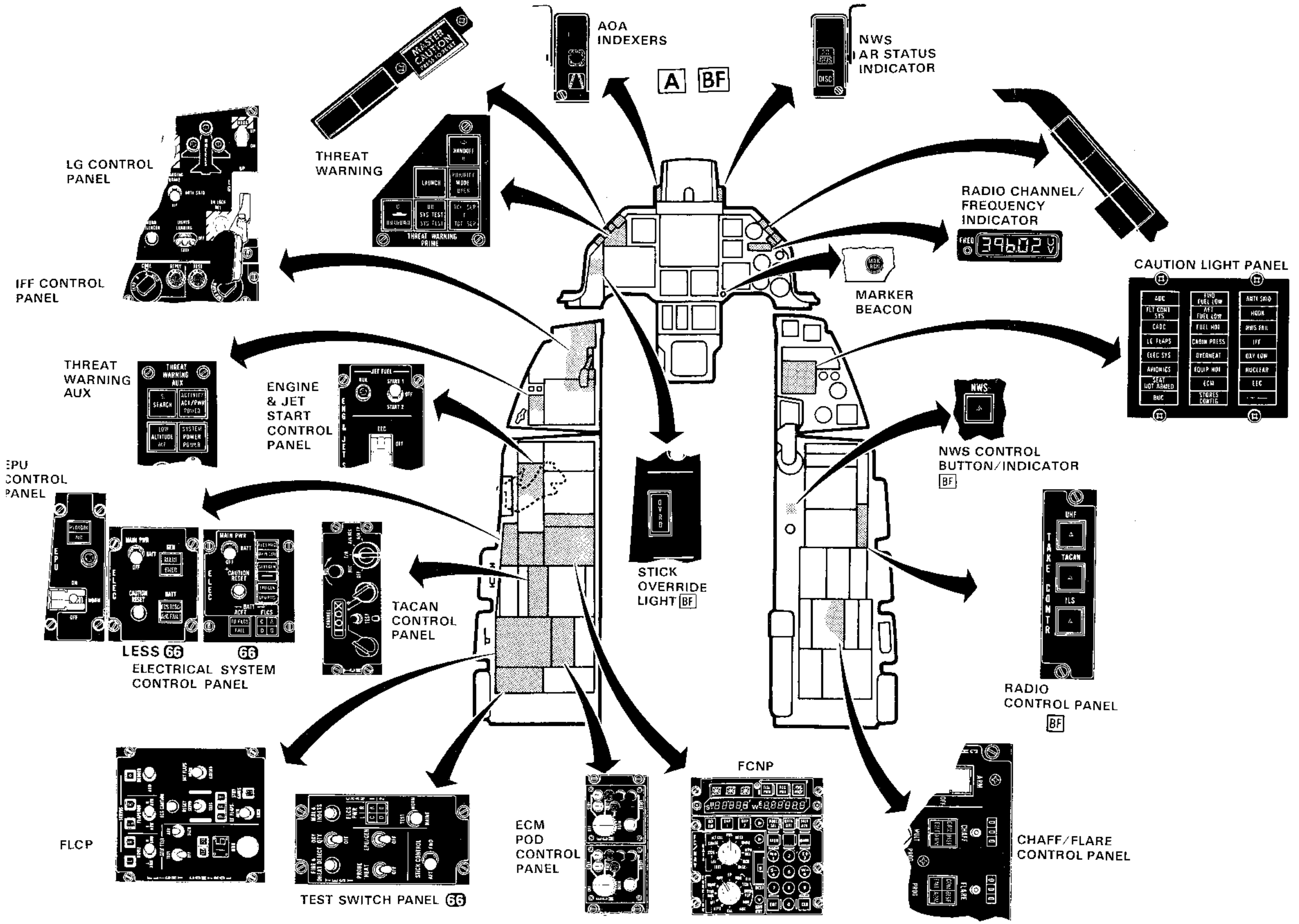
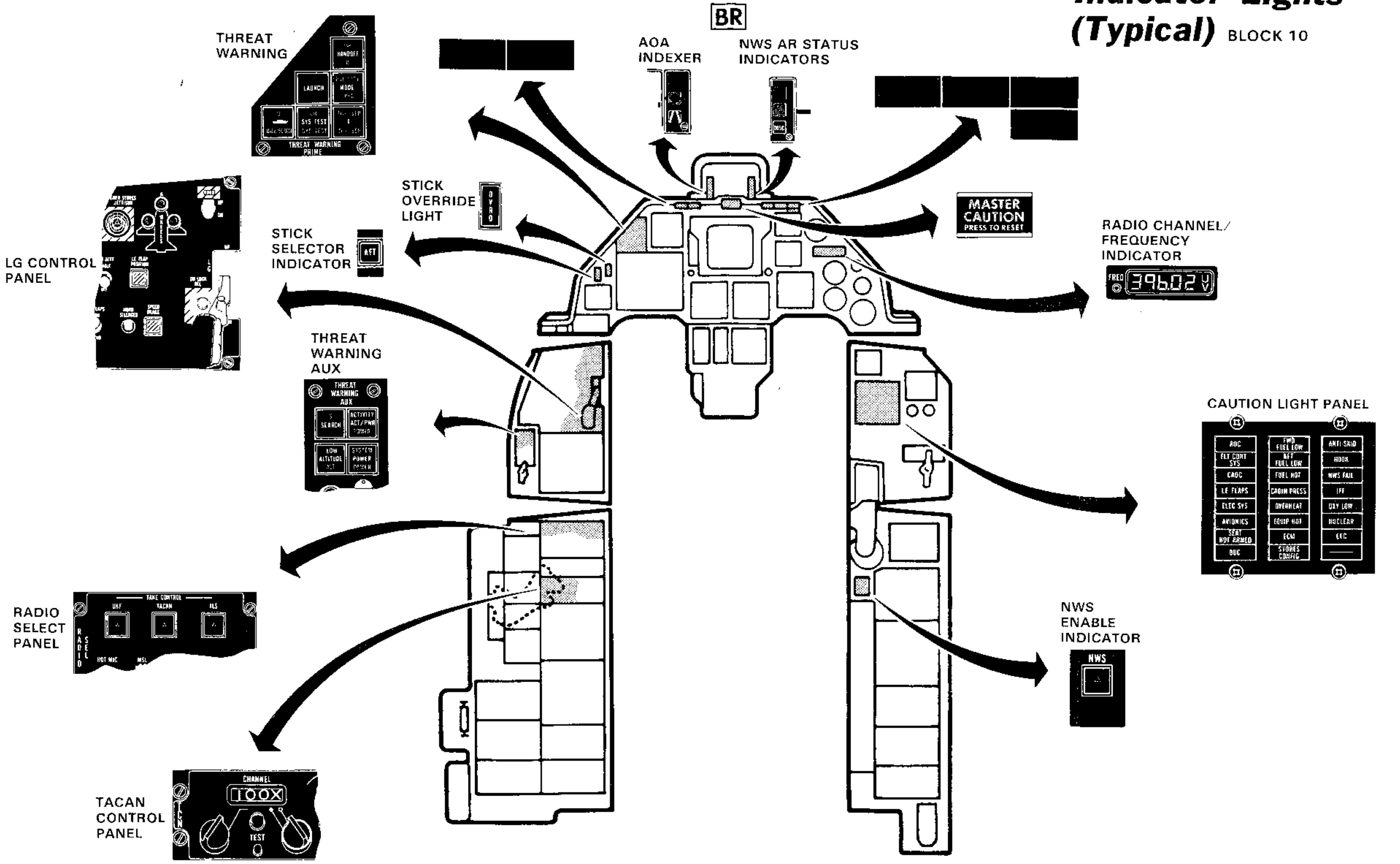


Figure FO-15. (Sheet 2)

1F-16A-1-0527

Warning, Caution, and Indicator Lights (Typical) BLOCK 10





1F-16A-1-0526

Figure FO-15. (Sheet 1)

Aircraft Modification/Retrofit Information

TV CODE/ T.O. NO.	SHORT TITLE	EFFECTIVITY PRODUCTION	*RETROFIT
72 1F-16-1121	Redesign LG Selector Valve to Eliminate Sensitivity to Metal Particle Contamination (ECP 0779)	US F-16A 81-0788 and on; F-16B 81-0821 and on	US F-16A 78-0001 thru 81-0787; F-16B 78-0077 thru 81-0820
		BE F-16A 80-3557/FA-66 and on; F-16B NA	BE F-16A 78-0116/FA-1 thru 80-3556/FA-65; F-16B 78-0162/FB-1 thru 80-3595/FB-20
*(In work; Recission Date: May 86		DE F-16A 80-3610 and on; F-16B 80-3615 and on	DE F-16A 78-0174 thru 80-3609; F-16B 78-0204 thru 80-3614
		NE F-16A 80-3636 and on; F-16B 80-3654 and on	NE F-16A 78-0212 thru 80-3635; F-16B 78-0259 thru 80-3653
		NO F-16A 80-3672 and on; F-16B 80-3693 and on	NO F-16A 78-0272 thru 80-3671; F-16B 78-0301 thru 80-3692
73 1F-16-1217	Install Fail-Safe Module on Main Fuel Shutoff Valve Actuator (ECP 1059 or DE equivalent)	US F-16A 82-1008 and on; F-16B 82-1046 and on	US F-16A 78-0001 thru 82-1007; F-16B 78-0077 thru 82-1045
*(In work; Recission Date: Jun 85		BE F-16A 80-3579/FA-88 and on; F-16B NA	BE F-16A 78-0116/FA-1 thru 80-3578/FA-87; F-16B 78-0162/FB-1 thru 80-3595/FB-20
		DE F-16A NA; F-16B 80-3615 and on	DE F-16A 78-0174 thru 80-3611; F-16B 78-0204 thru 80-3614 Equivalent Complete
		NE F-16A 81-0865 and on; F-16B 81-0883 and on	NE F-16A 78-0212 thru 81-0864; F-16B 78-0259 thru 81-0882
		NO NA	NO F-16A 78-0272 thru 80-3688; F-16B 78-0301 thru 80-3693

TV CODE/ T.O. NO.	SHORT TITLE	EFFECTIVITY PRODUCTION	*RETROFIT
74 1F-16-1216	Block 15S Software Update (ECP 0913)	US F-16A 83-1107 and on; F-16B NA	US F-16A 78-0001 thru 83-1106; F-16B 78-0077 thru 83-1173
*(Est Start May 85; Rescission Date: May 86)		BE NA	BE F-16A 78-0116/FA-1 thru 80-3587/FA-96; F-16B 78-0162/FB-1 thru 80-3595/FB-20
		DE NA	DE F-16A 78-0174 thru 80-3611; F-16B 78-0204 thru 80-3615
		NE F-16A 81-0880 and on; F-16B 83-1208 and on	NE F-16A 78-0212 thru 81-0879; F-16B 78-0259 thru 81-0885
		NO NA	NO F-16A 78-0272 thru 80-3688; F-16B 78-0301 thru 80-3693
75 1F-16-970	Provide a Guide for Canopy Handle Unlocking Tool (ECP 0458)	US F-16A 81-0788 and on; F-16B 81-0819 and on	US F-16A 78-0001 thru 81-0787; F-16B 78-0077 thru 81-0818
*(In work; Rescission Date: May 85)		BE F-16A 80-3557/FA-66 and on; F-16B NA	BE F-16A 78-0116/FA-1 thru 80-3556/FA-65; F-16B 78-0162/FB-1 thru 80-3595/FB-20
		DE F-16A 80-3610 and on; F-16B 80-3615 and on	DE F-16A 78-0174 thru 80-3609; F-16B 78-0204 thru 80-3614
		NE F-16A 80-3636 and on; F-16B 80-3654 and on	NE F-16A 78-0212 thru 80-3635; F-16B 78-0259 thru 80-3653
		NO F-16A 80-3672 and on; F-16B 80-3693 and on	NO F-16A 78-0272 thru 80-3671; F-16B 78-0301 thru 80-3692

TV CODE/ T.O. NO.	SHORT TITLE	EFFECTIVITY PRODUCTION	*RETROFIT
80 1F-16-1043	Modify BUC Control Circuit (ECP 0705)	US F-16A 83-1107 and on; F-16B NA	US F-16A 78-0001 thru 83-1106; F-16B 78-0077 thru 83-1173
*(Est Start Oct 85; Rescission Date: Oct 89)		BE NA	BE F-16A 78-0116/FA-1 thru 80-3587/FA-96; F-16B 78-0162/FB-1 thru 80-3595/FB-20
		DE NA	DE F-16A 78-0174 thru 80-3611; F-16B 78-0204 thru 80-3615
		NE F-16A 81-0880 and on; F-16B 83-1208 and on	NE F-16A 78-0212 thru 81-0879; F-16B 78-0259 thru 81-0885
		NO NA	NO F-16A 78-0272 thru 80-3688; F-16B 78-0301 thru 80-3693
83 1F-16-1297	Disconnect Fuselage Floodlight From Formation Light Circuit (ECP 1157)	US NA	US F-16A 80-0541 thru 83-1117; F-16B 80-0635 thru 83-1173
*(Est Start Mar 85: Recission Date: UNK)		BE NA	BE F-16A 80-3547/FA-56 thru 80-3587/FA-96; F-16B 80-3588/FB-13 thru 80-3595/FB-20
		DE NA	DE F-16A 80-3596 thru 80-3611; F-16B 80-3612 thru 80-3615
		NE F-16A 81-0880 and on; F-16B 83-1208 and on	NE F-16A 78-0258 thru 81-0879; F-16B 80-3649 thru 81-0885
		NO NA	NO F-16A 78-0300 thru 80-3688; F-16B 80-3689 thru 80-3693

1F-16A-1-0632B

Figure FO-16. (Sheet 3)